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ABSTRACT

This instructional unit was designed to enable students, primarily at the secondary level, to (1) classify soils according to current capability classifications of the Soil Conservation Service, (2) select treatments needed for a given soil class according to current recommendations provided by the Soil Conservation Service, and (3) interpret a typical land capability map provided by the Soil Conservation Service. Five major sections are included: Factors to Consider in Classifying Soils (texture, subsoil permeability, depth of surface soil and subsoil, slope, erosion, drainage); Land Capability Classes (class I, E soil classes, W soil classes, S soil classes, soil classification charts); Lane Use and Treatment; Soil and Water Conservation; and Soil and Water Conservation Plan. A soil texture chart and a glossary of terms (used in classifying soil and in determining recommended land use treatments) are appended. (HD)

SOIL CLASSIFICATION AND TREATMENT

State Department of Education
Office of Vocational Education
Agricultural Education Section
Columbia, South Carolina 29201

In cooperation with

Vocational Education Media Center
Clemson University
Clemson, South Carolina 29631

FOREWORD

An instructional program in soil classification, land use and proper treatment, has for many years been an important part of the total instructional program for students of vocational agriculture in South Carolina. The popularity of this program rests on the knowledge of students and teachers that soil is basic to all existence. A complete understanding of soils and proper land use helps the students of agriculture to determine, without trial and error, the crops best suited on a particular area of land for most efficient production.

The publication was first printed in 1957 and revised in 1965. This second revision was necessary due to changes in a number of soil classifications.

Grateful appreciation is extended to Dr. R. J. Mercer, Vocational Instructional Materials Specialist, Vocational Education Media Center, Clemson, for writing this publication and to Mr. Talbert Gerald, Assistant State Soil Scientist, Soil Conservation Service, Columbia, for providing the technical assistance. Sincere appreciation is also extended to Mr. E. B. Earle, Mr. R. R. Foster, and Mr. H. S. Clinkscales, members of the Curriculum Committee, who aided in planning the revisions and in revising the manuscript. Appreciation is also extended to the following Vocational Education Media Center personnel: Mrs. Joyce G. Farr for editing, Mr. R. D. Mattox for art work, and Mrs. Frances H. Earle for typing.

Use of this publication by teachers and students should result in a workable knowledge of our soils and also a better understanding of our soil and water management problems.

Frank R. Stover
State Supervisor
Agricultural Education

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IMPORTANCE OF SOILS

You are no doubt aware of the importance of soil – you know that without soil it would be very difficult (if not impossible) to grow plants. And without plants, animals could not live. You are also aware of the necessity of land for home, school, industrial or recreational sites. And, of course, land is essential for highways, railroads, airport sites, etc.

You may not know that soil (the outer surface of the earth which is capable of supporting plant life), so essential to us in the aforementioned ways, takes hundreds or even millions of years to form, depending upon rock type, weather conditions, slope, etc. Yet, it can be washed or blown away in a few days if not properly protected. Soil, then, is an important resource to all citizens of this country. It must be properly used and protected.

But to the farmer, soil is of even greater importance. Much, if not most, of his money is invested in land. And the way he uses this land directly affects his profits.

As you study this unit, you will learn many clues which will help you determine the capacity of a soil to grow plants. You will also learn numerous ways to treat or protect these soils.

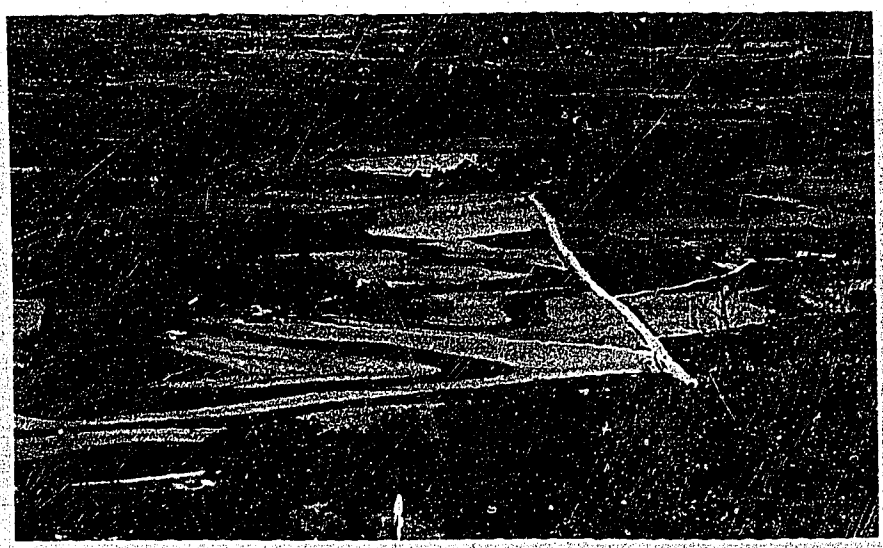


Figure 1. Much if not most of a farmer's money is invested in land. And the way he uses this lard affects his profits.

The major objectives of this unit are for you to be able to:

(1) Classify soils according to current capability classifications of the Soil Conservation Service.
(2) Select treatments needed for a given soil class according to current recommendations provided by the Soil Conservation Service.
(3) Interpret a typical land capability map provided by the Soil Conservation Service.

The unit is divided into five sections as follows:

Section One – Factors to Consider in Classifying Soils
Section Two – Land Capability Classes
Section Three – Land Use and Treatment
Section Four – The Soil and Water Conservation Plan
Section Five – The FFA Soil Judging Contest

In studying soils you will likely find that there are many words and expressions with which you are not familiar. It is important that you learn the meaning of the words defined in the glossary, Appendix A, and learn how to properly use them.

SECTION ONE
FACTORS TO CONSIDER IN CLASSIFYING SOILS

Things are classified as a short cut method of describing them. If you are asked about your car, you do not say it is a small car less than 12 feet (3.66 meters) in length with a small engine, etc. You probably say, "Oh, it's a compact." Most people know that cars are now roughly classified as "compacts" or "standards." All compacts have similar characteristics. Compared to standard models, they are small, have small engines, get good gas mileage and are less expensive. Since most people are familiar with the term compact, we simply say, "My car is a compact." Thus, classification provides a short cut method of communication.

Soils are classified for the same reason. Just as cars are classified according to similar traits, soils are grouped by similar characteristics. Soils with similar texture, permeability, drainage, slope, etc., are grouped together into a single class.

Things are classified, then, according to similarities or differences. And this classification saves time. People who work with soils speak of soils as being in a certain class, for example, Class III. A farmer may say, "I have a piece of Class IIIw land over near the river." Other farmers, familiar with land classification, would then have a good idea of the characteristics of this soil. They would know that this is nearly level or flat land with poor

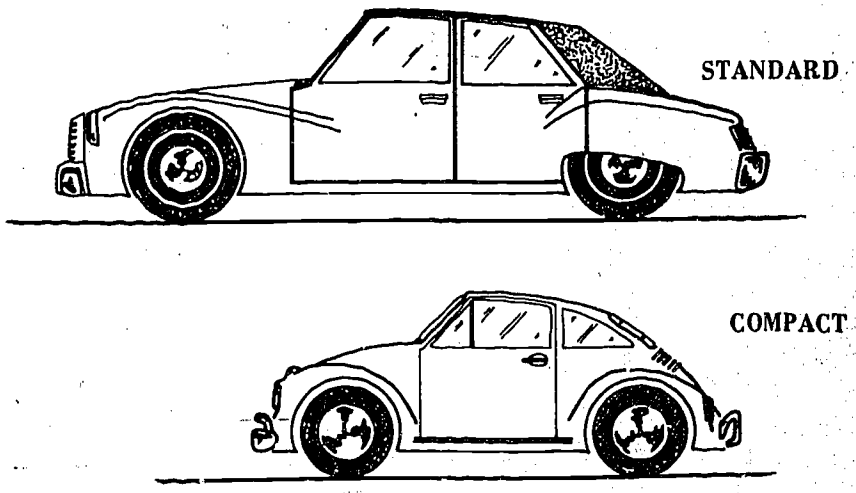


Figure 2. We classify things to save wordy descriptions.

drainage; rapid, moderate, or slow permeability; and is a deep or moderately deep soil. It requires drainage for crops and pasture. Drainage is the main problem in using this land. Bottomlands subject to occasional overflow may occur in this subclass. So, the ability to classify soils is a very important competency (skill). If you are to talk with farmers or other people who work with soils, you need to understand their language.

TEXTURE

What is soil texture?

To understand the idea of texture you must know that soil is composed of rock particles, organic matter, air and water. The rock particles are grouped into convenient size groupings called the sand, silt and clay separates. The proportional amounts of each of these separates determine the overall "feel" or texture of the soil. Therefore, texture means the relative proportions of sand, silt and clay in a soil material.

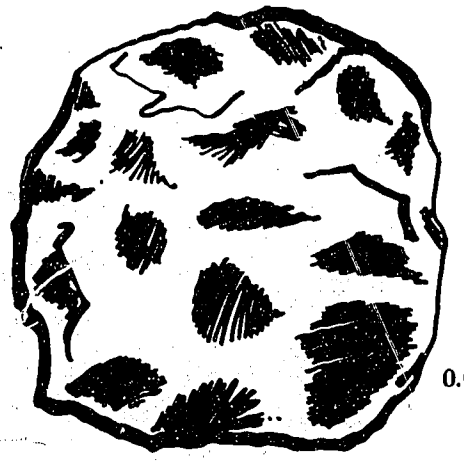


Figure 3. Note the relative difference in particle sizes.

The surface layer texture should be determined by examining a soil sample from the first six inches (15.2 cm) of soil or from the plow layer. Soils with more than 20 inches (50.8 cm) of a sandy surface layer will be considered as having a coarse texture

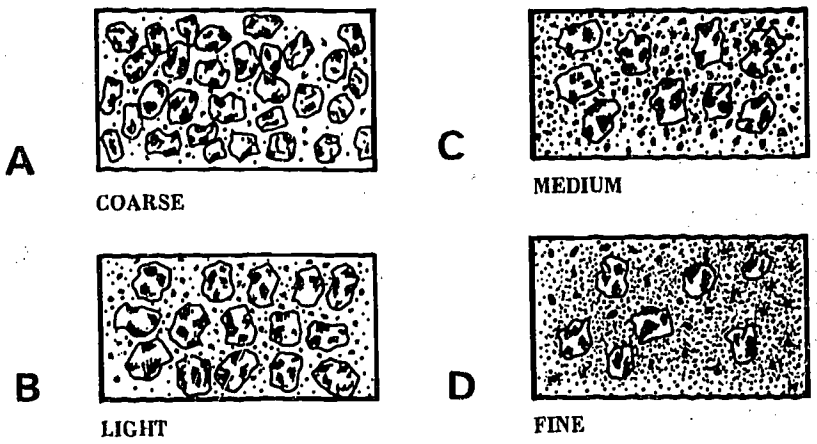


Figure 4. Soil Textures – soils are mixtures of sand, silts and clays.

and will usually be in subclass "s." Some soils with 20 inches (50.8 cm) or more of a sandy surface layer will be in subclass "w" if fair to poor drainage is present.

How is soil texture determined?

Texture is determined by rubbing and feeling the soil between the thumb and fingers. For best results the soil should be moist when determining texture.

- Sand tends to make soil gritty.
- Silt tends to make the soil feel floury.
- Clay tends to make the soil sticky and slick when moist but harsh and hard when dry.
- Loam contains sand, silt and clay but it feels neither very sticky nor very gritty.*

*For a more complete explanation of these terms see Appendix B.

In soil classification, texture is expressed as follows:

Coarse texture – Soils which feel very gritty because they contain mostly sand (see Figure 4A).

Light texture – A mixture of mostly sand, some silt and clay. Feel mostly gritty (loamy sands and sandy loams) (see Figure 4B).

Medium texture – Mixture of sand, silt and clay. Has a slight feel of grittiness (loams and silt loams) (see Figure 4C).

Fine texture – Soils contain enough clay, 30% or more, to make then feel very sticky (clay loam and clays) (see Figure 4D).

What is desired texture?

The ideal texture is light or medium. This texture allows for proper balance of nutrients and water holding capacity coupled with adequate aeration, drainage, and workability.

Suggested Learning Activity

You may wish to conduct or observe a demonstration showing the separation of soil particles. If so, proceed as follows:

Pour a cup of water into a pint jar. Then put in ½ cup of soil. Put a cover on the jar and shake it for about 30 seconds. Let it stand until the soil settles. Can you see layers of mud in the jar? Can you see a layer of clay? A layer of sand? Write the names of layers of soil. (Most of the sand particles will settle in about 1 minute; silt particles will settle in about 5 minutes; clay particles will take much longer to settle. After sand and silt have settled perhaps you can pour water containing clay into another jar and allow the clay to settle.)

Figure 5. Dry soils warm faster than wet soils.

Why is texture important?

Texture or particle size, as mentioned earlier, to a large extent determines the character of a soil. The larger the soil particle size, the less tightly it will stick together. Therefore, air and water can more easily enter and move through the soil. This means that less water is held by the soil. And this means that such soils will dry out faster after a rain. The fact that these soils tend to dry out faster may mean that they "warm-up" earlier in the spring. This is true because it takes less calories to warm soil than it does to warm water. (See Figure 5.)

Another characteristic (trait) of coarse soils is that they contain less nutrients (mineral elements, e.g., nitrogen, phosphorus, potassium, magnesium, etc.). This is because they have less surface area than soils composed mainly of small particles such as clay. Why is that? Think of it this way. An apple has a certain amount of surface. Suppose you cut the apple into half. You have now increased the amount of surface. And, suppose you cut each half into quarters. You have again increased the amount of exposed surface area. It is obvious that the more you cut the apple the

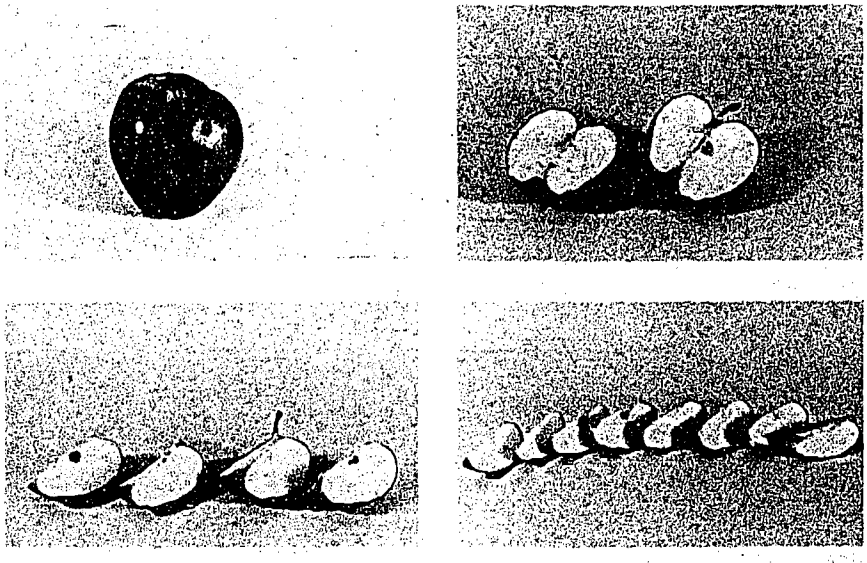


Figure 6. **The more the apple is cut, the smaller the pieces, but the greater the surface area exposed. The same is true of soil — the smaller the particles, the greater the surface area exposed.**

smalier each part of the apple becomes, but the greater the total surface area becomes. If you were to attempt to put as much sugar as possible on an apple, would it not pay you to cut it into many parts? And so with a soil particle. The smaller the soil particle the more surface area is exposed and the more surface on which nutrients such as magnesium, potassium, etc., can be attached. Likewise, it can attach more water molecules.

It is obvious then that texture is one of the most important characteristics of soils. Through its effect on soil consistency (how it clings together), it affects tillage. In other words, the coarser the soil, the looser the soil. The looser the soil, the easier it is to plow, the more rapidly and easily water passes through it, and the more nutrients are dislodged from the soil particle. Since potash is very loosely attached to the soil particle, it is especially apt to leach (be dislodged) from coarse textured soils. Coarse soils are usually low in most plant nutrients. The more desirabie soils contain a variety of particle (separate) sizes.

Since coarse soils are loose, plant roots can easily penetrate the soil. This is good in the case of crops with low moisture requirement such as Coastal Bermuda and Bahia grass. It is not good for most legumes and grasses which require considerable moisture.

The opposite is of course true of the finer textured soils. They absorb water more slowly but hold the water absorbed. Water does not pass through these soils easily, and nutrients are

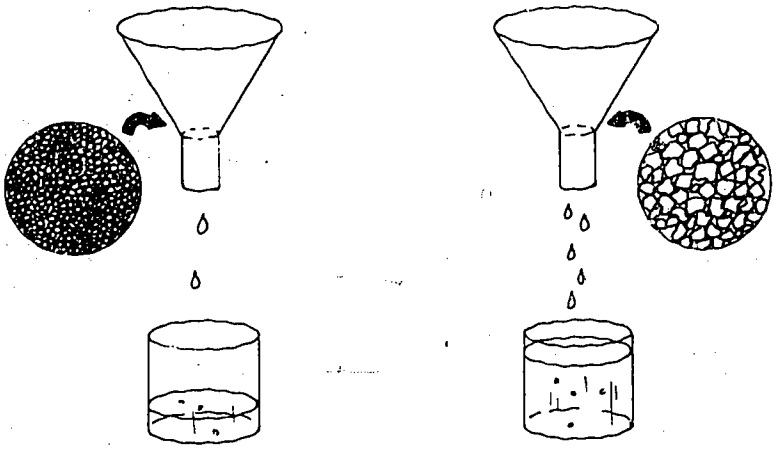


Figure 7. Water passes through coarse textured soils more rapidly than through fine textured soils.

not easily dislodged. Since these soils are tighter, they are more difficult to plow. They dry more slowly after a rain and warm up more slowly in the spring.

Thus, the texture of a soil determines largely:

- The rate at which water can enter the soil
- The water-holding capacity of the soil
- The rate at which plant nutrients leach
- The kind of crops which can be grown
- The method of tillage
- The rate of movement of soil by erosion agents

How does texture influence farming?

The following information indicates how texture affects farming:

Coarse and Light Textured Soils:

- Leach rapidly, surface dries out quickly
- Are usually low in plant nutrients
- Require frequent but light applications of plant nutrients
- Are easy to work, can be plowed soon after a rain
- Usually require extra potash
- Are not well adapted to clover and most legumes and grasses (except Sericea, Coastal Bermuda, and Bahia grass).

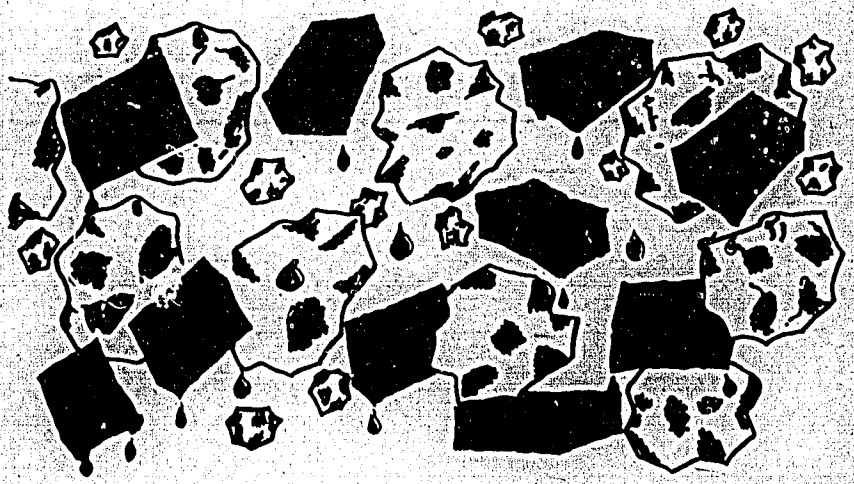


Figure 8. Organic matter is somewhat like a sponge in a soil – it holds water; it prevents packing. It also provides food for micro-organisms.

Medium and Fine Textured Soils:

- Absorb water more slowly than light soils
- Hold more water than light, sandy soils
- Contain more plant nutrients
- Are more difficult to work
- Are better suited to grasses and legumes than the lighter soils.

What can be done to improve the unfavorable effects of texture?

Soil texture cannot be changed, but we can modify (change) the effect of texture by adding organic matter (decaying plants or animals).

SUBSOIL PERMEABILITY

What is permeability?

Permeability refers to the movement of water and air in the soil. It may be expressed as rates of percolation. This means the amount of water (inches per hour) that is able to move downward through the soil. Permeability may vary within layers of a given subsoil. For example, the first 6 inches (15.2 cm) might have good permeability whereas the next 4 inches (10.2 cm) might have slow permeability. Note, however, that it is the most restrictive layer which determines permeability. This is usually the most clayey layer. However, a few soils have a hard pan which is the most restrictive layer. In soil classification you are mainly concerned with the permeability of the subsoil because the rate of water movement through the soil has a definite influence on its productiveness.

TABLE 1. Percolation Rate of Subsoil

Soil Type	Inches Per Hour	
Soil A	.04	(.10 cm)
Soil B	1.32	(3.35 cm)

Notice that only .04 of an inch (.10 cm) of water per hour can enter and move through the subsoil of Soil A. This means that this soil, particularly if part of the topsoil has eroded, can absorb only a light, slow rainfall in a given length of time. Notice the greater percolation rate of Soil B. Subsoil B has a percolation rate

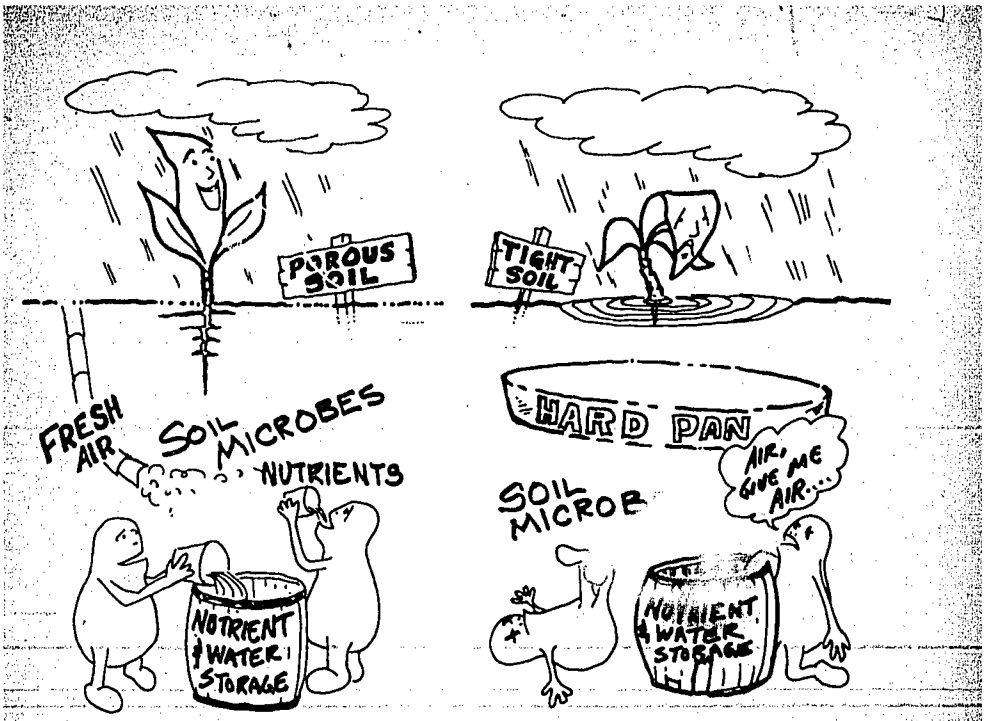


Figure 9. **A hardened layer of soil is called a hard pan. A hard pan can prevent water, air and nutrients from moving through the soil.**

Adapted from Land Judging in North Carolina, Extension Circular 393, The North Carolina Agricultural Extension Service, North Carolina State University, Raleigh, North Carolina.

of 1.32 (3.35 cm). This means there would be no runoff unless the rainfall was greater than 1.32 inches (3.35 cm) per hour, provided the topsoil was not puddled.

Suggested Learning Activity

You may wish to conduct or observe the following demonstration:

Tie or tape cheesecloth over one end of each of three open glass cylinders. Fill the first container three-fourths full of dry clay, the second with sand, and the third with loam containing humus. Pour one-half pint (.237 liters) of water into each at the same time. Compare the length of time for percolation and the amount of water that passes through.

What soil characteristics indicate permeability?

There are several clues to the permeability of a soil. One is texture. The smaller the separate (particle) size the tighter the soil hangs together, so the slower the rate of permeability. But this is not always true because these separates (particles) often hang themselves together differently. In other words they form aggregates of different sizes and shapes or the particles form different structures. Structure is sometimes classified as blocky, platy, granular or single grained (see figure 10). Structure, then is a second clue to permeability.

So you cannot depend on texture alone for determining permeability of a soil. Besides, soils are usually made up of a mixture of particles of various textures. The aggregate (combination of particles) and the structure formed by the aggregates may give better clues to permeability.

You can tell something about permeability by breaking a lump of soil. Lumps of soil that are relatively easy to break are usually from soils with good permeability. Also soils with good permeability have a large number of pores (empty spaces).

Permeability affects the quality of the entire soil, but is thought of most often in relation to the subsoil. Most soils used for row crops have a layer of relatively coarse soil on top. The firmer textured particles are leached (moved) to the lower levels by

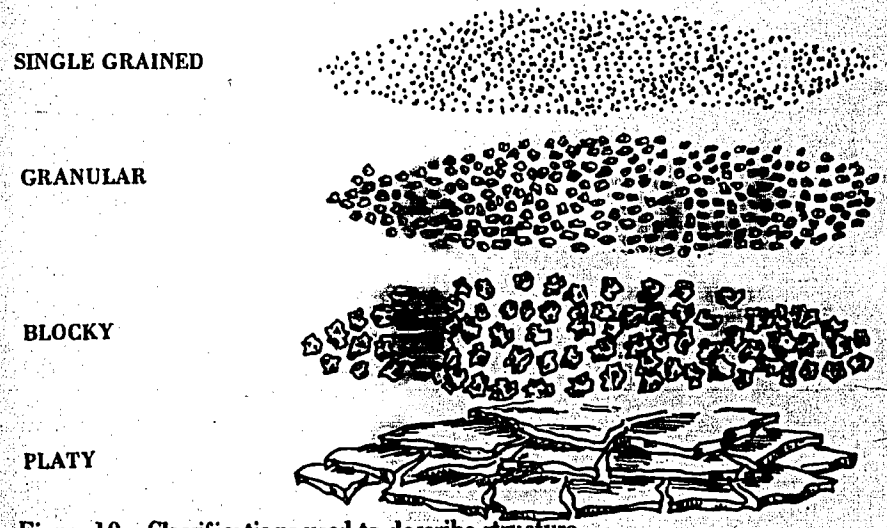


Figure 10. Classifications used to describe structure.
Adapted from Land Judging in North Carolina, Extension Circular 393

water. Therefore, the topsoil is relatively loose and permeable compared to the finer textured subsoil. So, in a typical soil used for growing row crops, the concern for permeability is with the subsoil. And, remember that the permeability of a soil is determined by the most restrictive layer.

What is the desired subsoil permeability?

The ideal subsoil permeability for most plants is moderate. It should permit plant roots, water and air to move readily in the soil and hold sufficient water between rains or irrigations.

How is permeability expressed?

Degrees of Permeability:

Slow – Sticky or plastic clay subsoils. Few pores are visible.
Moderate – Granular clay to sandy clay loam subsoils; well defined nut-like structure; visible pores of varying size.
Rapid – Loamy sand to sandy loam subsoils, with coarse granular structure; pores large and numerous.
Very Rapid – Sandy subsoils; single grained structure; moderate or small amount of organic matter.

Rate of Permeability:

Slow – less than 0.6 inches/hour (1.52 cm/hr.)
Moderate – 0.6 - 2 inches/hour (5.08 cm/hr.)
Rapid – 2 - 20 inches/hour (5.08 – 50.80 cm/hr.)
Very Rapid – more than 20 inches/hour (50.80 cm/hr.)

How does soil permeability affect erosion?

Soils which have very tight subsoils of low permeability erode (wash away) easily. Why - because soils which have a slow rate of percolation (water moving downward) cannot absorb heavy rainfall. Consequently, water runs off as soon as the surface soil is saturated.

Study the permeability (percolation rate) of the subsoil of two different kinds of soil as shown in table 1.

Summary

Several characteristics indicate permeability:

- Texture of subsoil
- Type of subsoil structure (shape of soil aggregates)
- Ease of natural breakage
- Size and number of visible pores
- Amount of organic matter.

DEPTH OF SURFACE SOIL AND SUBSOIL

What is meant by the depth of the surface soil and subsoil?

Depth refers to that area of both surface soil and subsoil down to but not including the parent material.

Ranges in soil depth are:

Deep	40 inches or more	(approx. 1 meter)
Moderately deep	20 to 40 inches	(approx. .5 - 1 meter)
Shallow	10 to 20 inches	(approx. .25-.5 meter)
Very shallow	less than 10 inches	(approx. .25 meter)

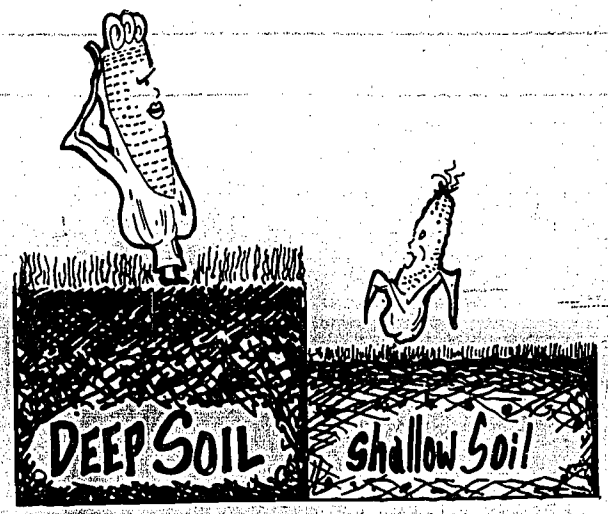


Figure 11. An adequate root zone is essential for good crop production.

Adapted from Land Judging in North Carolina, Extension Circular 393, The North Carolina Agricultural Extension Service, North Carolina State University, Raleigh, North Carolina.

Why is soil depth important?

The productive ability of land largely depends upon its depth

of soil. A deep-bodied beef animal has the ability for high beef production. A dairy cow with a large barrel has great capacity for food and water which are necessary for high production. Likewise, deep soils are necessary to provide the needed water and nutrients for favorable plant production.

Deep soils have the capacity for more plant nutrients and water and provide a large area for root development. Shallow soils have a limited capacity for plant nutrients, water, and root development.

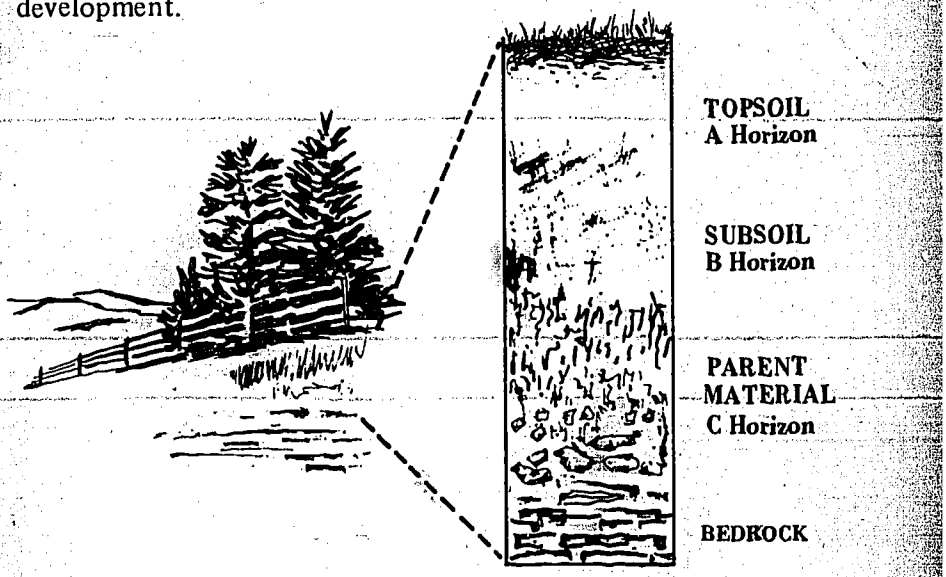


Figure 12. A soil profile.
Adapted from Land Judging in North Carolina, Extension Circular 393

How does the depth of soil affect the use of the land?

Shallow soils are not well adapted to deep-rooted crops and those crops requiring large amounts of moisture.

The soil depth influences, to a great extent, the conservation practices needed on the land. The number and kind of terraces, use of strip cropping, and amount of vegetative cover needed is largely determined by the depth of the soil.

Terraces are not ordinarily used on soils with thick, sandy surface layers. This is because thick soils are usually coarse soils and terraces built of coarse soils are easily washed away. Strip cropping or contour farming may be more effective in preventing erosion on these soils.

What is the ideal soil depth?

The ideal soil depth is 40 inches or more (approximately 1 meter).

SLOPE

What is soil slope?

Slope is the number of feet fall in each 100 feet (30.48 meters) measured horizontally in the direction of the steepest slope. Slope is very important in identifying soil since it influences erosion, conservation practices, and the use of the land. Slope is expressed as follows:

Degree of Slope	Slope Classification	Number of Feet Fall Per 100 Feet (30.48 meters)	
		Feet	Meters
Nearly level	A	0 to 2	0 to .61
Gently sloping	B	2 to 6	.61 to 1.8
Sloping	C	6 to 10	1.8 to 3.0
Strongly sloping	D	10 to 15	3.0 to 4.6
Moderately steep	E	15 to 25	4.6 to 7.6
Steep	F	25 to 40	7.6 to 12.2
Very steep	G	above 40	above 12.2

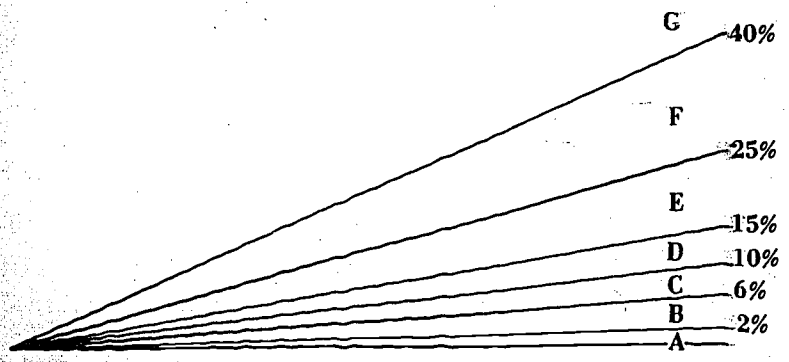


Figure 13. Judging slope is essential for classification.

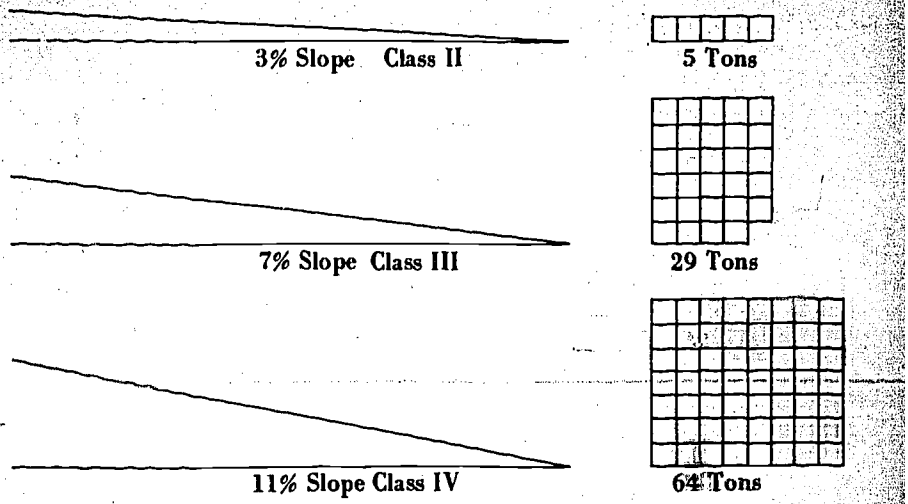


Figure 14. Approximate loss of soil over a 5-year period on a Cecil soil which produced one bale of cotton.*
***Southern Piedmont Conservation Experiment Station, Progress Report, Watkinsville, Georgia, 1949.**

What is the relation of slope to erosion?

With the same cover conditions, losses from erosion usually become greater as the slope of the land increases. As the land becomes steeper a greater percentage of rainfall is lost as runoff. The carrying capacity of the runoff water increases rapidly as the slope becomes greater. It is estimated that by doubling the speed of water, its ability to move particles is increased 64 times; its capacity to carry material in suspension is increased 32 times; its total erosive power is four times greater.

Figure 14 shows how slope influences the amount of soil lost on different slopes.

Suggested Learning Activity

You may wish to observe the effectiveness of strip cropping. If so, proceed as follows:

Make a box about 30 inches x 30 inches x 4 inches (.76 x .76 x .11 meters) with one side lacking. Fill with topsoil and pack firmly. Plant grass seeds in strips about three inches wide (7.62 cm), leaving a three-inch strip

(7.62 cm) of bare soil between each strip of grass. When the grass has grown to about two inches (5.08 cm), sprinkle water over the box of grass first in a level position, then at a slight angle, [illegible]lly at a steep angle. Explain what happens in [illegible]ase.

How does slope affect the use of land?

Slope must be considered when deciding what crop to grow on the land and how soil and water losses may be prevented.

The value of permanent vegetation on the steeper slopes is shown by the following table.

TABLE 2. Annual Loss of Rainfall and Soil on 6 Percent Slope with Different Crops Receiving Same Amount of Rain, 6-Year Average

Crops	Runoff		Soil Loss Per Acre (metric		Length of Plot	
	(inches)	(cm)	(tons)	tons)	(feet)	(meters)
Cotton, cont.	13.38	34	22.11	20.05	35	10.67
Sericea	3.36	8.53	.32	.29	35	10.67

Southern Piedmont Conservation Exp. Sta., Progress Report, Watkinsville, Ga., 1949.

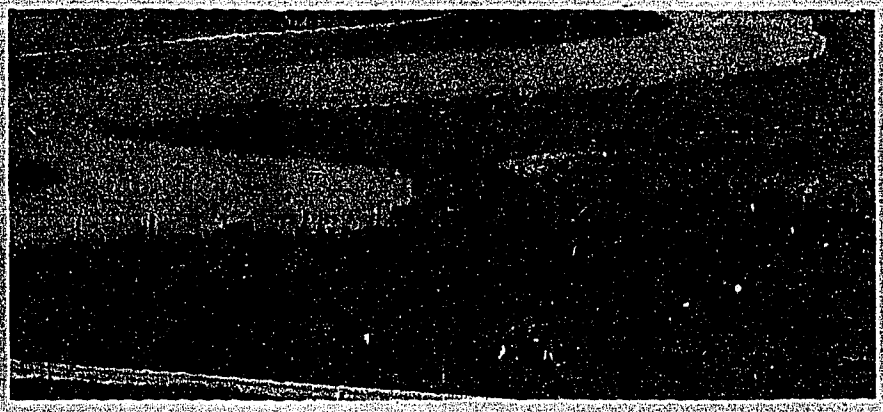


Figure 15. Stripcropping involves alternating strips of close growing crops with row crops.

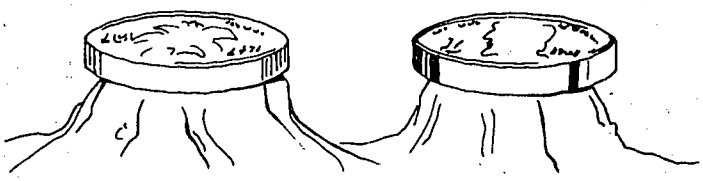


Figure 16. As illustrated above, soil cover can help prevent soil erosion. Note how the coins protect the soil from washing.

The information in Table 2 shows that vegetative cover such as sericea is very effective in holding rainfall on the land and preventing soil erosion. This is true to a certain extent of many crops (annual lespedeza, clover, grasses and small grains) that may be used to protect sloping land. These crops can be used as permanent strips, in rotations, and as annual strips depending somewhat on the slope of the land.

Suggested Learning Activities

You may wish to conduct or observe one or both of the following demonstrations.

Raindrop Splash and Raindrop Erosion – Fill tin cans with soil. Level off the soil at the top and place a coin on the surface of the soil. Produce a hard, beating artificial rain with spray can. Notice how the coin protects the soil; the raindrop splash produces erosion all around the outside of the coin on the level soil.

Plant Cover Prevents Erosion – From your school yard or nearby roadside collect two bucketfuls of bare soil. Empty the buckets of soil into two piles on a large piece of plywood or large flat board (approximately 4 feet x 3 feet (1.2 x .91 meters). Steel or aluminum

sheets may also be used for this purpose. Shape each pile of soil into a mound. Tilt each board to form a gentle slope. To one mound of soil, apply an organic covering such as straw, sawdust, peat moss, forest duff, leaf mold or clipped grass. By means of two sprinkling cans with one gallon of water in each, apply the same amount of artificial rain to each pile of soil. Observe how much soil is washed from the unprotected mound as compared with the mound having protective cover. This demonstration can be performed on a much more accurate basis by weighing each soil sample and collecting and measuring runoff from each sample.

EROSION

What is erosion?

Erosion refers to the loss of soil by water and wind. Water erosion causes the greatest damage in this state, however, wind erosion may frequently be a problem in the Coastal Plain. Water erosion is designated as sheet erosion, rill (small gully) and gully erosion.

Figure 17. Gully erosion – a result of improper land and water management.

Suggested Learning Activity

You may wish to conduct or observe the following demonstration showing wind erosion.

Wind Erosion – Use electric fan or vacuum cleaner attachment to show how wind will blow unprotected soil. A sample of bare soil and one of protected soil with straw or grass will show how unprotected soil erodes and how surface cover prevents the soil from blowing away. Use pine or brush twigs (6 inches - 7 inches high) (15.2 cm - 17.8 cm) to build miniature windbreaks on the unprotected soil.

What are the effects of erosion?

Some effects of erosion are:

- Loss of organic matter and plant nutrients
- Loss of soil particles
- Smaller crop yields
- Less water-holding capacity of the soil
- Increased cost of tillage
- Reduction of the benefits from fertilizers

The topsoil (A-Horizon or surface layer) is considered the life of the land. This is the first part of the soil to be lost by erosion. The original topsoil of the Piedmont and Upper Coastal Plain of South Carolina was approximately nine inches (22.9 cm). Today it is about six inches (15.2 cm). This means, on an average, that we have lost about one-third of our surface soil. In many places, all of

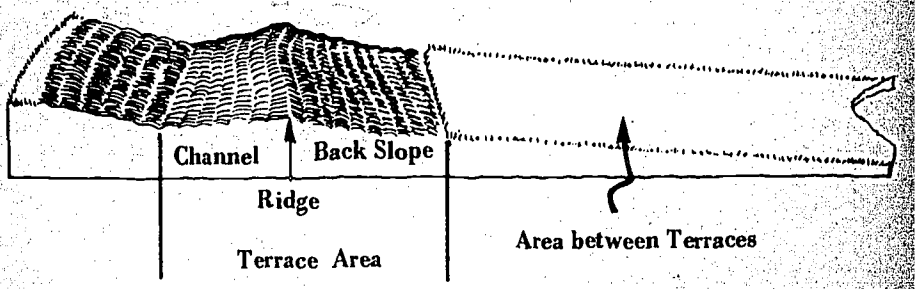


Figure 18. Terraces help prevent erosion by spreading and slowing the flow of surplus water. This drawing shows a cross sectional view of a typical terrace.

the topsoil is gone. The importance of preventing erosion is illustrated by the following table which shows differences in yields obtained by growing cotton on topsoil, subsoil and parent material (decaying rock).

TABLE 3. Cotton Yields on the Three Soil Horizons*

Horizon	Per Acre (Seed Cotton)	
	Pounds	Kilograms
Topsoil (A-Horizon)	939	425.37
Subsoil (B-Horizon)	304	137.71
Parent Material (C-Horizon)	81	36.69

*H. H. Bennett, S.C.S., Erosion of Topsoil Reduces Productivity, Washington, D.C.

Usually the yields of all crops are decreased as the topsoil becomes thinner. Data from the Experiment Station at Watkinsville, Georgia, indicate that an inch (2.54 cm) of topsoil is worth 104 pounds (47.17 kgs) of seed cotton, 3.5 bushels (approximately 123 liters) of corn, and 3.8 bushels (approximately 134 liters) of oats in terms of annual yield.

Suggested Learning Activity

You may wish to observe the effects of soil erosion on plant growth by setting up the following demonstration:

Obtain two buckets or jars. Fill one with good topsoil, the other with soil from an eroded area or the bank of a gully or road cut. Plant a few seeds in both containers. Use the same amounts of water in each.

Why is erosion more damaging on some soils than on others?

Erosion is considered a hazard (major factor) on all "e" land and on "s" land with a slope of more than 6 percent.

Several factors determine the seriousness of erosion on soils:

- Land cover. Soils under sod lose little water and erosion is greatly decreased.
- Thickness of the topsoil. Naturally the loss of a given amount of topsoil is more serious on a 6-inch (approximately 15 cm) topsoil than on one of 12-inch (approximately 30 cm) depth.
- Nature of the subsoil. This includes the workability, structure, fertility and water-holding capacity of the subsoil or B-Horizon.
- Depth of soil.

How is erosion described?

Colluvial – deposits from nearby slopes.
Alluvial – stream deposits.
None to slight – less than 25 percent of the original topsoil removed; no gullies.
Moderate – from 25 percent to 75 percent of topsoil lost, with or without gullies; no deep gullies.
Severe – 75 percent to 100 percent of topsoil lost; may have occasional deep gullies.
Very severe – all of the topsoil lost and up to 25 percent of subsoil lost; may have frequent deep gullies.
Very severe gullied – badly gullied land; cannot be used for crops or pasture.

How can we prevent erosion?

To prevent erosion we must:
- Know the physical characteristics of our soils.
- Be able to determine the proper land use and needed conservation measures.
- Have the ability to apply the needed treatments to the land.
- Know what crop or crops the land is best suited for.

DRAINAGE

Why is soil drainage important?

Drainage refers to the presence or absence of excess water in the soil for varying lengths of time. For best production, soils must

have a proper balance of water, air, organic matter, soil particles, bacteria and animal life. Some soils require by volume approximately 30 percent water and 20 percent air for high production. Soils must have adequate drainage to have necessary air space, bacteria, and animal life. Soil air plays an important part in aiding the breakdown of organic matter, releasing plant nutrients, and supplying the necessary oxygen. Too much water in the soil reduces the air content and prevents or retards these chemical changes. Since roots need air, they grow shallow in poorly drained soils. This may result in drought damage later in the season due to the shallow root development.

How is drainage indicated?

One of the main indicators of drainage is the color of the subsoil. Soil color is due to the presence of iron and aluminum (many forms) and organic matter. The term mottling is frequently used in discussing soil drainage. Mottling refers to color spots in the subsoil. Mottling of gray in the soil profile indicates poor aeration which is caused by too much soil water. Brighter yellowish or reddish color, with little or no mottling, indicates better aeration through proper drainage. See diagrams on page 25.

How are different degrees of drainage described?

In studying and identifying soils, we score the drainage of a particular field or area in terms of very poor, poor, fair, good, and excessive. These are the terms used on the score card.

Drainage Classes for FFA Soil Judging

Very Poor Drainage – Very poorly drained soils are black or very dark gray to a depth of 10 inches (approximately 25 cm) or more, and subsoils are solid gray or may have a few mottles of yellow, brown, or red. Water stands at or near the surface for long periods of time. Water control is often difficult and diking and pumping may be required in a drainage system for the removal of excess water. The number of crops adapted to these soils is very limited.

Poor Drainage – Poorly drained soils have subsoils that are dominantly gray with mottles of yellow, brown, or red. These soils require drainage for the production of crops. Some of these soils, especially those of the Lower Coastal Plain, are adapted to a variety of crops while others are adapted to only a few crops.

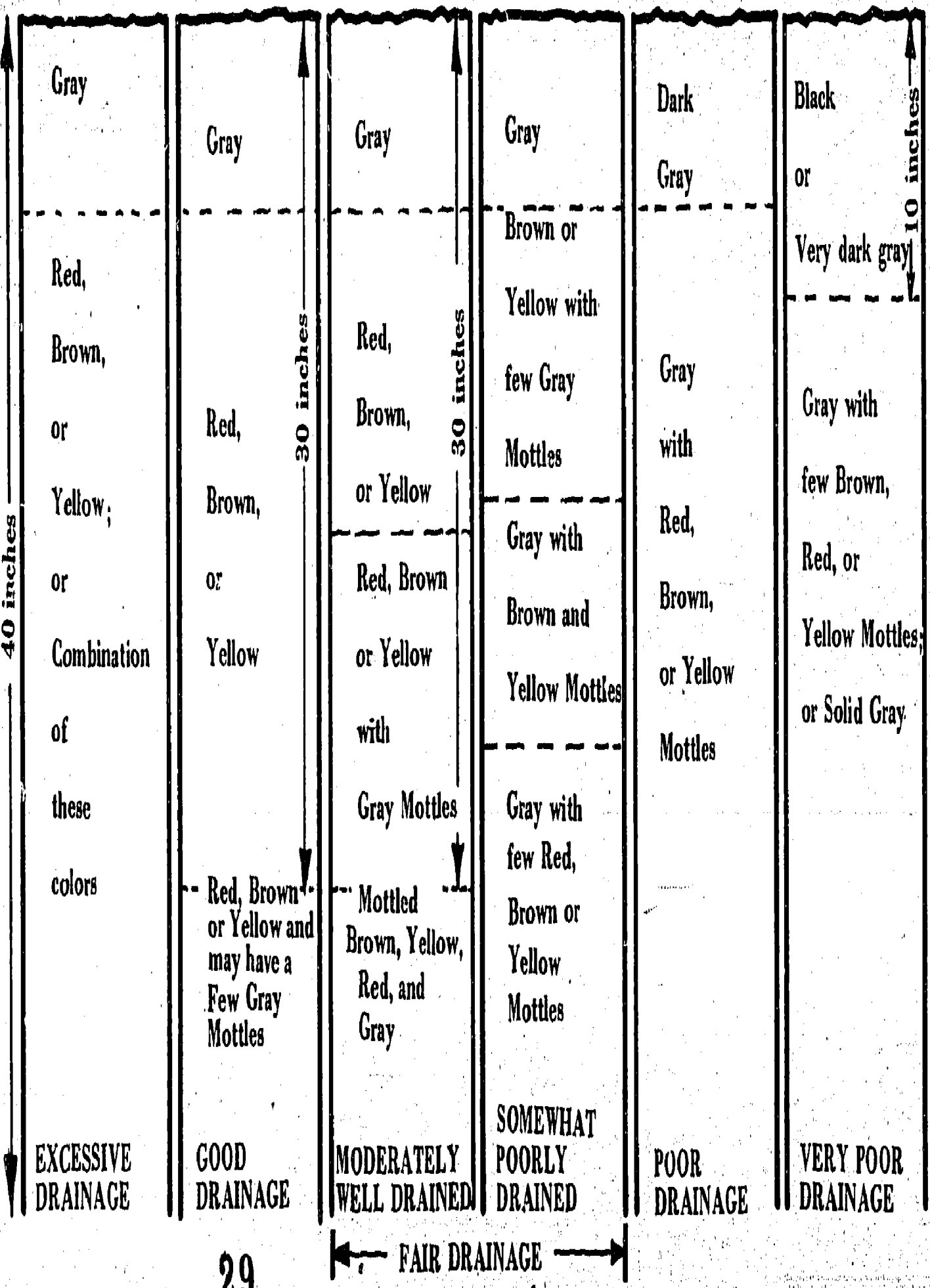


Figure 19. Drainage classes.

Fair Drainage – This includes soils which are somewhat poorly drained and those moderately well drained. Somewhat poorly drained soils have subsoils that are dominantly yellow or brown with a few gray mottles in the upper part and dominantly gray in the lower part. Drainage is needed for the production of adapted crops. Moderately well drained soils are oxidized and free from mottling in the upper part of the subsoil, but have gray mottles within 30 inches (.76 meter) of the surface. Crops growing on these soils may suffer from excess of water during wet spells. It may be necessary to furnish artificial drainage for normal yields of certain crops.

Good Drainage – Soils with good drainage are well oxidized and free from gray mottling in the soil to a depth of 30 inches (.76 meter). Gray mottles may be present below 30 inches (.76 meter). This is the ideal soil drainage condition.

Figure 20. Flooding – A frequent problem in low areas.

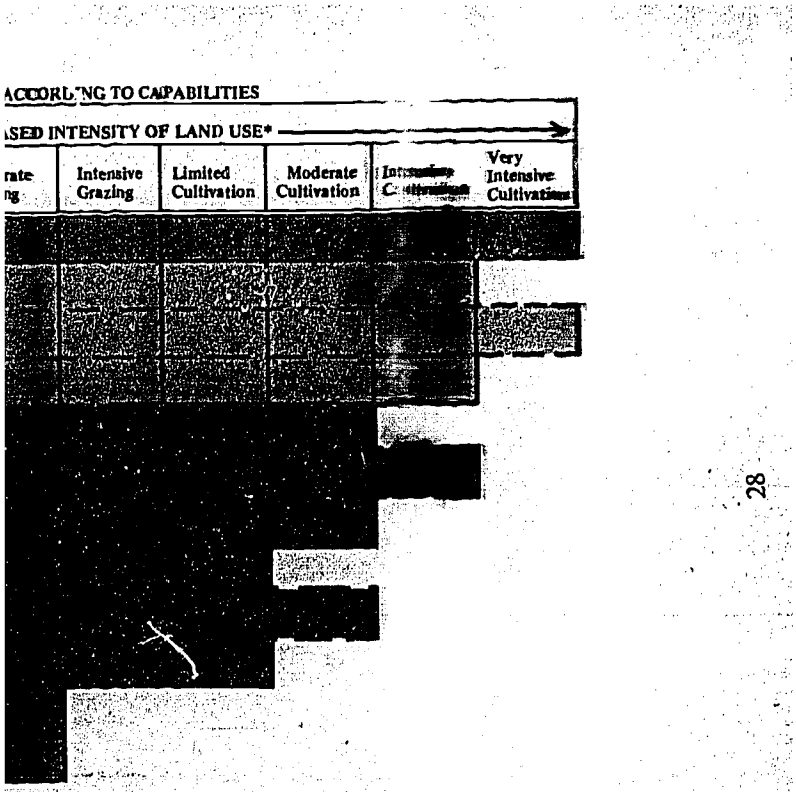
Excessive Drainage – This refers to soils which are coarse textured to a depth of more than 40 inches (approximately 1.02 meters) and have subsoil colors which indicate good aeration – red, brown, or yellow; or combination of red, brown, and yellow. Excessive drainage means that water escapes from the soil too rapidly as in deep sand and loamy sand with reddish, brownish, or yellowish colored subsoil. The addition of organic matter aids in reducing the effects of excessive drainage.

How is flooding expressed?

Flooding is frequently a problem especially on lands near streams or rivers. Severity of flooding is described by degrees as follows:

- Occasional Flooding – less often than once in 2 years
- Frequent Flooding – more often than once in 2 years
- Duration of Flooding:
  - Very Brief – less than 2 days
  - Brief – 2 to 7 days
  - Long – 7 days to 1 month
  - Very Long – more than 1 month

*The intensity of cultiv



A modification of a drawing by the Teaching Materials Center, Texas A&M University.

rodible soils and the installation and maintenance of drains on wet soils.

SECTION TWO
LAND CAPABILITY CLASSES

All land is grouped into eight capability class . In Section One you learned some characteristics used to differentiate soils – texture, permeability, drainage, slope, erosion, depth of topsoil and subsoil.

Soils are grouped into capability classes according to the number and severity (seriousness) of limitations or hazards. Class I soils have no limitations of use. These soils can be put into row crops; they can be put into pasture; they can be used for growing trees; they can be used for wildlife or recreation. But Class VIII soils have very severe limitations. They can be used only for recreation or wildlife. Land is classified, then, according to its capacity to be used (capability). And this capability is based on the number and severity of limitations.

What are these limitations upon which classes are grouped? Actually any of the six soil characteristics you studied in Section One can directly or indirectly impose a limitation. A very thin soil imposes a serious limitation. Obviously the thinner the soil the more difficult it will be to grow plants. In the case of soil thickness, the degree of limitation is usually directly related to the thickness of the soil. Slope can also be a limitation, and again the degree of the limitation due to slope is directly related to severity of slope. For example, when the angle of slope becomes greater than 25% it would be hazardous to try to use the land for anything other than forest land. Poor drainage or coarse textured, thick topsoils can also impose serious limitations to land use. The higher the class of land the greater the number or severity of limitations or hazards. See the chart on the preceding page.

Land is further classified into subclasses. The subclasses recognized in South Carolina are as follows: Subclass (e), subclass (w), and subclass (s). These subclasses may occur in all classes of land except Class I. The letters indicating subclass have a definite meaning – (e) represents erosion; (w) means wetness; and (s) indicates a sandy or stony soil condition. The subclass, then, tells us the major kind of limitation or hazard. For example, Class IIe means that the land is suitable for cultivation with certain conservation practices and erosion is the major hazard. Where soil conditions are such that two or more hazards or limitations exist that are essentially equal, the "e" (erosion) hazard takes precedence over "w" or "s" conditions, and "w" takes precedence over "s" conditions in deciding the subclass. In other words, if a

Class II soil is equally eroded and wet, its subclass would be "e" – Class IIe. If a Class II soil is equally wet and saner, it would be classified as Class IIw. Land then is first classified by size or degree of limitation or hazard. It is further classified by its major type or kind of hazard. A full description of the classes and subclasses of land follows beginning on page 31.

LAND CAPABILITY CLASSES

Suitable for Cultivation

I Requires good soil management practices only

II Moderate conservation practices necessary

III Intensive conservation practices necessary

IV Perennial vegetation – Infrequent cultivation

No Cultivation – Pasture, Hay, Woodland and Wildlife

V No restrictions in use

VI Moderate restrictions in use

VII Severe restrictions in use

VIII Best suited for wildlife and recreation

Figure 21. A Pickens County scene showing the eight land capability classes. (Courtesy of SCS)

CLASS I – This land is nearly level and deep, with light or medium surface layer texture, moderate permeability, good drainage, none to slight erosion, or it may have colluvial deposits. This is good, productive land that can be safely cultivated with ordinary farming methods. It can be cultivated every year and kept in good condition by adding the needed fertilizer, lime, and organic matter. It is not subject to overflow.

"E" SOIL CLASSES

Subclass IIe – This land is gently sloping, deep or moderately deep, with none to slight or moderate erosion, moderate or slow permeability, coarse, light, or medium surface layer texture, and good or fair drainage. An occasional galled spot may be present. It requires terraces or contour strips, contour tillage, meadow outlets, and crop rotations when used for cultivated crops. Not over half of this land should be in row crops during any one year (2 year rotation).

Figure 22. Conservation measures and proper management is essential on "e" soils to prevent erosion. (Courtesy SCS)

Subclass IIIe – This land is gently sloping with severe erosion; or sloping with none to slight or moderate erosion; deep or moderately deep with moderate or slow permeability; coarse, light, or medium surface layer texture; and good drainage. More galled areas occur than in subclass IIe. The plow layer is often a mixture of topsoil and subsoil. It requires terraces, contour cultivation, meadow outlets, and crop rotation when used for cultivated crops. Erosion is the main problem on this land. Not over one-third of this land should be in row crops during any one year (3 year rotation).

Subclass IVe – This land is gently sloping with very severe erosion, sloping with severe erosion, or strongly sloping with none to slight or moderate erosion; deep, moderately deep, or shallow with moderate or slow permeability; and good drainage. This subclass includes strongly sloping soils with a sandy surface layer 20 to 40 inches (50.8 - 101.6 cm) thick, moderate or slow permeability, and good drainage. This subclass is best suited to pasture or trees. When it is necessary to cultivate this land, not over one-fourth of the area should be planted to row crops in any one year (4 year rotation).

See page 29 regarding two or more soil conditions as they affect the subclasses. Because of slope the sandy soil described is placed in IVe rather than IVs. Because of the 20 to 40 inch (50.8 - 101.6 cm) sandy surface, the soil should not be terraced.

Subclass Ve – There is no subclass Ve recognized in South Carolina.

Subclass VIe – This land is sloping with very severe erosion, strongly sloping with severe erosion, or moderately steep with none to slight or moderate erosion; deep, moderately deep, or shallow with moderate or slow permeability. Much of this land is in trees and should remain in trees. If it is cleared, it should be plowed only to prepare a seedbed for a permanent sod.

Subclass VIIe – This land is strongly sloping with very severe erosion, moderately steep with severe or very severe erosion, or steep or very steep with any degree of erosion. This soil may be deep, moderately deep, shallow, or very shallow. It is best suited to trees. Some conditions may justify pasture or perennial legumes. Extreme caution should be used to maintain vegetative cover at all times.

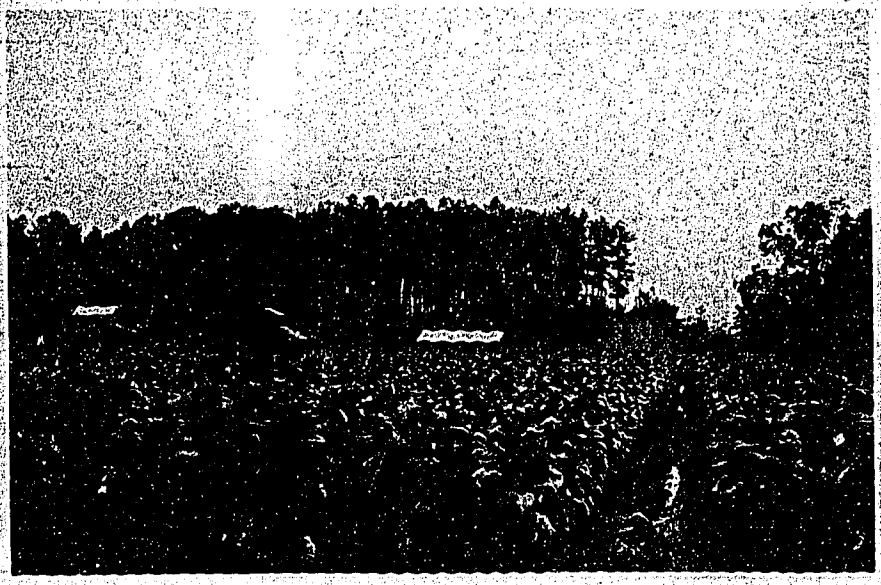


Figure 23. Proper drainage is essential for good yields. Tobacco on adequately drained soil. (Courtesy of SCS)

Subclass VIIIe – There is no subclass VIIIe recognized in South Carolina.

"W" SOIL CLASSES

Subclass IIw – This is nearly level or flat land with fair drainage; moderate or slow permeability; and deep or moderately deep soil. It requires some drainage for crops and pasture, and requires the same rotations as Class I land. Bottomlands subject to occasional overflow may occur in this subclass.

Subclass IIIw – This is nearly level or flat land with poor drainage; rapid, moderate, or slow permeability; and deep or moderately deep soil. It requires drainage for crops and pasture. Drainage is the main problem in using this land. Bottomlands subject to occasional overflow may occur in this subclass.

Subclass IVw – This is nearly level or flat land with very poor drainage; rapid, moderate or slow permeability; and deep or moderately deep soil. Water stands at or near the surface for long

periods of time and it may be subject to frequent overflow. It is best suited to pasture, hay or trees. If used for pasture or hay, drainage is necessary.

Subclass Vw – This is flat, very poorly drained land. Because of location and soil conditions, it is not feasible to drain and use this land for crops. It may be subject to frequent overflow. It is best suited to pasture or trees. Special drainage is required for the development of productive pastures.

Subclass VIw – This is nearly level or flat, wet land with water at or above the surface for very long periods of time. It is best suited for pasture or trees. Intensive drainage is required for the development of productive pastures.

Subclass VIIw – This is flat, permanently wet, swampy land which is covered with water most of the time. It is not practical to drain this land. It is best suited to cypress and hardwood trees and wildlife areas.

Subclass VIIIw – This is salt water tidal marsh suitable only for wildlife.

"S" SOIL CLASSES

Subclass IIs – This land is nearly level or gently sloping, deep or moderately deep, moderate or slow permeability, none to slight erosion, good drainage, and coarse surface layer texture that is 20 to 40 inches (50.8 - 101.6 cm) thick. This subclass includes soils that are nearly level and deep with slow permeability, none to slight erosion, and coarse or light surface layer texture less than 20 inches (50.8 cm) thick. It requires special soil and moisture conserving practices as well as fertilizer practices. This subclass is subject to leaching nd blowing in dry windy seasons. Not over half of this land should be in row crops during any one year (2 year rotation). NOTE: Terraces are not recommended on subclass "s" land. Use parallel strips, contour cultivation, and meadow outlets in draws.

Subclass IIIs – This land is nearly level or gently sloping, deep with rapid permeability, coarse surface layer texture, none to slight erosion, and fair or excessive drainage. This subclass includes

Figure 24. Soils should be used according to their capability. Coastal Bermuda grass is well suited to this class IIIs soil. (Courtesy SCS)

sloping soils with a sandy surface layer 20 to 40 inches (50.8 - 101.6 cm) thick, moderate or slow permeability, and good drainage. It requires more intensive soil and moisture conserving practices than IIs. This subclass is subject to severe leaching and blowing in dry seasons. Not over one-third of this land should be in row crops any one year (3 year rotation).

Subclass IVs – This land is nearly level or gently sloping with very rapid permeability, or sloping with rapid or very rapid permeability, coarse surface layer texture, none to slight erosion, and excessive drainage. This subclass also includes gently sloping, very stony land with none to slight erosion, and moderate permeability. Row crops are not recommended; best suited to trees or perennials.

Subclass Vs – There is no subclass Vs recognized in South Carolina.

Subclass VIs – This land is strongly sloping with rapid or very rapid permeability, coarse surface layer texture, none to slight

erosion, and excessive drainage. This subclass also includes sloping or strongly sloping, very stony land, with none to slight erosion. Suitability is limited to pasture, trees, or wildlife cover.

Subclass VIIs – This land is moderately steep, steep, or very steep; very sandy and droughty, or very stony. Suitable only to trees or wildlife.

Subclass VIIIs – This includes rock outcrops, extremely stony land, and beaches. Suitable for wildlife, recreation, and commercial purposes.

The following charts will summarize and help simplify classification. You may wish to use these charts as a check sheet until you become more experienced in classification.

CLASS I SOIL

Class	Surface Texture	Subsoil Permeability	Depth of Subsoil and Topsoil	Drainage	Erosion	% Slope	Surface Layer
I	Light or Medium	Moderate	Deep	Good	None to Slight	0 - 2 Nearly Level	

"E" SOIL CLASSES

Class	Surface Texture	Subsoil Permeability	Depth of Subsoil and Topsoil	Drainage	Erosion	% Slope	Surface Layer
IIe	Coarse, Light or Medium	Moderate or Slow	Deep or Mod. Deep	Good or Fair	None to Slight or Moderate	2 - 6	
IIIe	Coarse, Light or Medium	Moderate or Slow	Deep or Mod. Deep	Good	Severe	2 - 6	
					None to Slight or Moderate	6 - 10	
IVe	Coarse, Light Medium, or Fine	Moderate or Slow	Deep, Mod. Deep, or Shallow	Good	Very Severe	2 - 6	
					Severe	6 - 10	
					None to Slight or Moderate	10 - 15	
		Moderate or Slow		Good		10 - 15	20 - 40 inches
Ve	NONE RECOGNIZED IN SOUTH CAROLINA.						
VIe		Moderate or Slow	Deep, Mod. Deep, or Shallow		Very Severe	6 - 10	
					Severe	10 - 15	
					None to Slight or Moderate	15 - 25	
VIIe			Deep, Mod. Deep, Shallow, Very Shallow		Very Severe	10 - 15	
					Severe or Very S.	15 - 25	
					Any Degree	25 - 40	
					Any Degree	40+	
VIIIe	NONE RECOGNIZED IN SOUTH CAROLINA.						

"W" SOIL CLASSES

Class	Surface Texture	Subsoil Permeability	Depth of Subsoil and Topsoil	Drainage	Erosion	% Slope
IIw	Light or Medium	Moderate or Slow	Deep or Moderately Deep	Fair	Alluvial or Colluvial None to Slight	0-2
IIIw	Light, Medium, or Fine	Rapid, Moderate, or Slow	Deep or Moderately Deep	Poor	Alluvial or Colluvial None to Slight	0-2
IVw	Light, Medium, or Fine	Rapid, Moderate, or Slow	Deep or Moderately Deep	Very Poor	Alluvial or Colluvial None to Slight	0-2
Vw	NOT FEASIBLE TO DRAIN			Very Poor		0-2
VIw	WATER STANDS AT OR ABOVE THE SURFACE FOR LONG PERIODS OF TIME.					0-2
VIIw	PERMANENTLY WET, SWAMPY – COVERED WITH WATER MOST OF THE TIME.					0-2
VIIIw	SALT WATER TIDAL MARSH					0-2

"S" SOIL CLASSES

Class	Surface Texture	Subsoil Permeability	Depth of Subsoil and Topsoil	Drainage	Erosion	% Slope	Surface Layer
IIs	Coarse	Moderate or Slow	Deep or Mod. Deep	Good	None to Slight	0 - 2 or 2 - 6	20 - 40 inches
	Coarse or Light	Slow	Deep	Good	None to Slight	0 - 2	Less than 20 inches
IIIs	Coarse	Rapid	Deep	Fair or Excessive	None to Slight	0 - 2 or 2 - 6	More than 40 inches
	Coarse	Moderate or Slow	Deep	Good	None to Slight	6 - 10	20 - 40 inches
IVs	Coarse	Very Rapid	Deep	Excessive	None to Slight	0 - 2 or 2 - 6	More than 40 inches
		Rapid or Very Rapid				6 - 10	
		Moderate			None to Slight	2 - 6	Very Stony
Vs	NONE RECOGNIZED IN SOUTH CAROLINA.						
VIs	Coarse	Rapid or Very Rapid	Deep	Excessive	None to Slight	10 - 15	More than 40 inches
					None to Slight	6 - 10 or 10 - 15	Very Stony
VIIs						15 - 25 25 - 40 40+	Very Sandy and Droughty or Very Stony
VIIIs	THIS INCLUDES ROCK OUTCROPS, EXTREMELY STONY LAND, AND BEACHES.						

SECTION THREE
LAND USE AND TREATMENT

To be able to classify land by physical characteristics is important, but to be able to recommend uses and treatments for land is of equal or even greater importance. Classification is a necessary first step because it helps us identify the problems to be dealt with in selecting land uses and treatments. Good use of land means selecting crops which are well adapted to the land while at the same time improving or maintaining the land. But selecting an appropriate use may also involve selecting proper treatments. For example, growing crops on sloping land would be acceptable if the crops grown were adapted and treatments such as strip cropping and rotation were used to protect the soil from erosion. But some land cannot be cultivated even with the most intensive treatment and the land is best used for other purposes such as forestry, wildlife or recreation. Knowing how to select the most appropriate use of a piece of land and how to select proper treatments for

Figure 25. Tile drainage being installed. (Courtesy SCS)

using the land is a very important skill — a skill that can "make or break" a farmer.

In order to select appropriate land treatments, the name of the treatment and the purpose of the treatment need to be known. Some of the more important questions concerning the selection and use of treatments are as follows:

Why cultivate land on the contour?

- Tends to hold runoff water which prevents erosion and silting of the terrace channel.
- Results in greater absorption of water by the soil.
- Reduces soil, water, and fertilizer loss.
- Makes for better farm machinery operation.

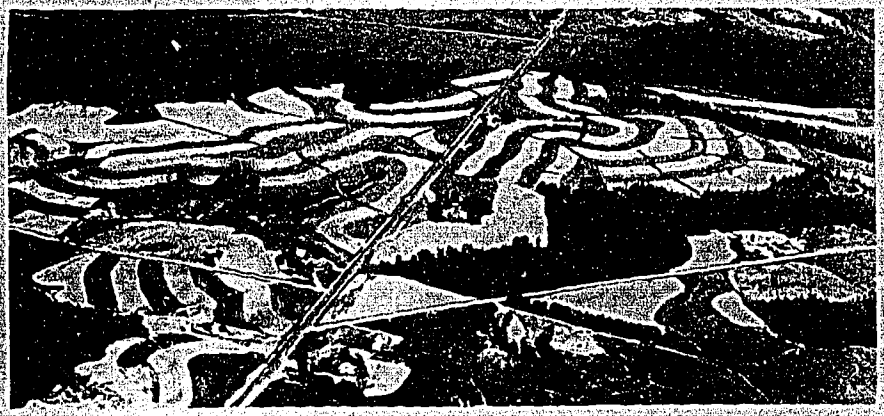


Figure 26. An aerial view of contour farming. Contour farming reduces soil, water, and fertilizer loss. (Courtesy SCS)

Why terrace land which is planted to annual crops?

- Breaks the length of slope, thus preventing a concentration of water, and carries surplus water slowly from the field.
- Serves as a permanent marker for a row layout, contour cultivation, and for vegetative cover needed for erosion control and soil improvement.
- Aids in conserving moisture.
- Uses equipment already available on most farms to cultivate, construct, and maintain.

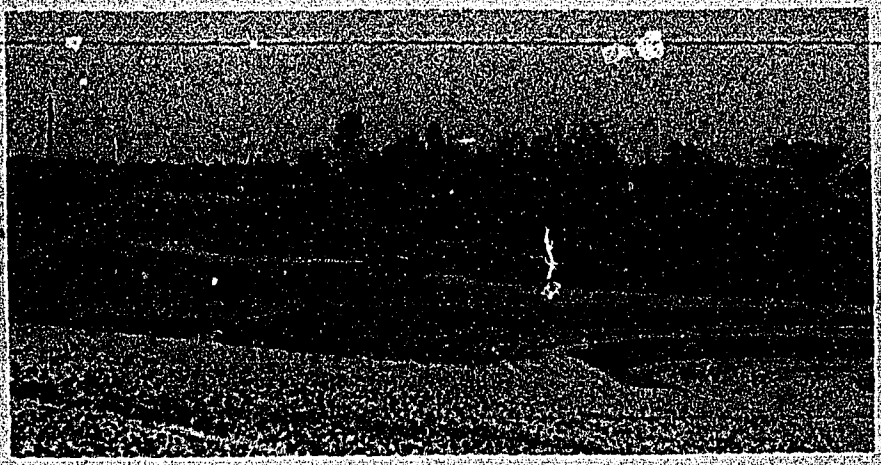


Figure 27. Terracing breaks the length of the slope, thus preventing a concentration of water, and carries surplus water slowly from the field.

Why establish meadow strips or outlets?

- Uses draws (low places) so surplus water will be concentrated less.
- Uses draws to straighten out cultivated rows, decrease the number of point rows, and improve row drainage.
- Furnishes a needed supply of hay or some grazing at a critical season of the year by having enough area in close growing crops to justify mowing.
- Requires different land use from the surrounding land. Draws grow too much weed for cotton or are too soggy for row crop cultivation, thus more strip cropping with the strips running up and down the draw should be established.
- Uses meadows for seed patches for such crops as Sericea, Bahia, Fescue, Ladino Clover and Coastal Bermuda grass.

Why is strip rotation frequently used?

- Provides additional insurance against erosion and heavy runoff on rather steep slopes.
- Encourages a more desirable balance in crop acreages, particularly when fields vary in size.
- Reduces wind erosion.
- Encourages continuous maintenance of terraces.

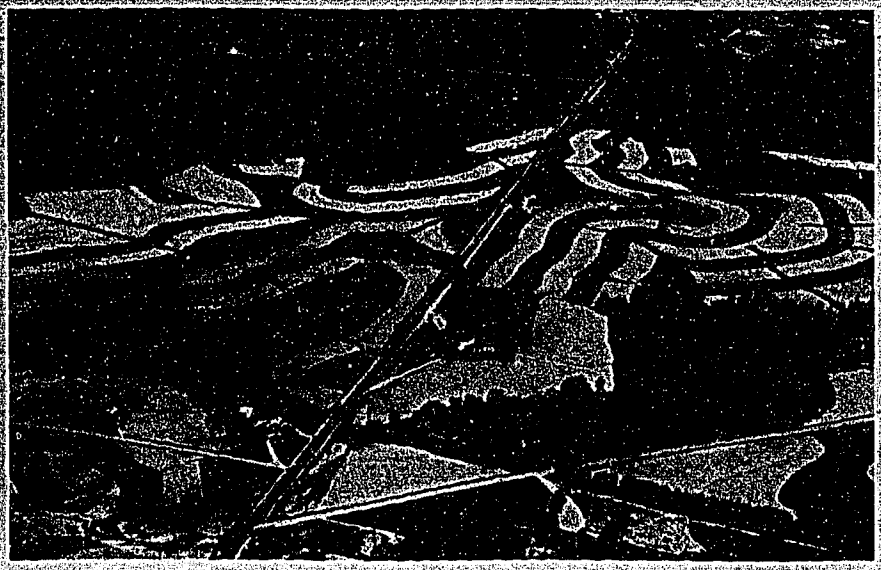


Figure 28. Planting alternate strips of close growing crops with row crops helps prevent erosion. (Courtesy SCS)

- Makes for plowing only strips rather than large areas of the field at one time.
- Encourages tilling the soil and harvesting on or near the contour.
- Makes possible fewer short rows.
- Uses close growing strips advantageously in harvesting row crops.

Why rotate and use cover crops?

- Aids in controlling disease, insect and weed damage.
- Provides vegetative cover, adds organic matter and nitrogen, and improves the soil structure.
- Reduces runoff and soil erosion; the soil absorbs more moisture.
- Reduces soil depletion when rotations include soil improving crops.
- Protects the soil against the beating action of rainfall.
- Improves the physical condition of the soil.
- Increases desirable bacteria.
- Produces better yields and increases farm income.

Why plant perennial crops?

- Saves time on yearly plantings. Perennials (Sericea, Bahia, Coastal Bermuda, Alfalfa, and Fescue) do not have to be planted each year.
- Allows more of the summer legumes to be used for soil improvement.
- Uses poor land or steep slopes effectively to provide grazing, to provide hay, to aid in erosion control and to conserve water.
- Adds humus and nitrogen to badly eroded and overcropped land. The use of perennial crops is the most effective, economical way of controlling gullies and reducing erosion where water is concentrated.

Why avoid burning crop residue?

- Adds organic matter and plant nutrients to the soil by mixing crop residue with the soil.
- Reduces the drain of plant nutrients from the soil by turning under crop residue.
- Saves time and energy by not destroying crop residue.
- Increases the moisture holding capacity of sandy soils.
- Improves workability of soils which tend to be tight. Crop residue should be turned under early to allow ample time for decay.

Why plant field borders?

- Provides a vegetative cover which prevents erosion.
- Checks the growth of briars, bushes, and trees which tend to come in the field.
- Provides grazing, hay, and seed.
- Provides food and cover for wildlife.
- Provides excellent areas for turn-rows and access roads.

Why plant wildlife areas?

- Provides a means of conserving and using odd, unproductive spots or corners of a farm.
- Encourages more wildlife by providing food and cover.
- Makes use of heavy machinery more satisfactory.

Why establish a drainage system?

- Removes excess water so air can occupy this space in the soil.
- Takes much less heat to warm a drained soil — a wet soil is a cold soil.
- Germinates seeds faster and a better stand is obtained in a drained soil.
- Reduces the possibility of plants drowning after a rain.
- Makes possible plowing, planting, and cultivating the whole field at the same time.
- Provides for a bigger and more even yield at harvest time as crops are not lost because of wet spots or wet ground.
- Improves resistance to summer drought as roots penetrate deeper in a drained soil.

Figure 31. Poorly drained soils may require open ditches for effective drainage. (Courtesy SCS)

Figure 32. Tile drainage on a Lynchburg loamy sand. Tile drainage may be adequate on soils with fair or poor drainage. (Courtesy SCS)

The following list of recommended land treatment practices are those found on the FFA Soil Judging Score Card. The recommended uses are also explained. Those practices which are printed in bold type are called Use practices because they denote the major purpose for which the land is to be used. They are as follows: **(1) Plant to row crops, (20) Establish permanent pasture, (21) Plant to perennials, (30) Plant to trees and (39) Develop into wildlife area**. One of these use practices is selected for each field being judged. After the use practice has been selected, supportive practices which will improve or protect the soil are selected. These practices should be selected with the use practice in mind. For example, if practice 1, **Plant to Row Crops**, is selected as the use practice, other practices such as practice 11, Burn no Crop Residue, may be relevant. But, if use practice 20, **Establish Permanent Pasture**, is selected, then practice 11 would not be relevant.

Practice Number	Recommended Land Treatments
1	**Plant to Row Crops** – This practice will be used when the farmer desires to put this acreage in row crops.
2	Farm on Contour – This practice is to be used on all cultivated land that does not require terraces but has some slope, which is usually less than 2 percent or is a deep sand that is not to be terraced.
3	Terrace and Farm on Contour – This is used on cultivated land in Classes IIe and IIIe which are to be used for row crops. Standard type terraces are not generally recommended on Class IVe land, but contour cultivation is recommended wherever it is necessary to cultivate Class IV land.
4	Establish Meadow Outlets – This practice is used where land requires terraces and where well stabilized woods or good sod pastures are not available for row and terrace drainage. All natural draws in fields should be used to establish meadow outlets. This practice is used in conjunction with practice no. 2 or no. 3.
5	Establish Strip Rotation (2-3-4 yr.) – This practice is recommended on sloping cultivated fields of Class II, III, or IV soils where row crops are to be grown and the field is over 40 acres (16 hectares). You should indicate the length of rotation. A two-year rotation with one-half of the strips in close growing crops applies to Class II land; a three-year rotation with two-thirds of the strips in close growing crops to Class III land; and a four-year rotation with three-fourths of the strips in close growing crops to Class IV land.
6	Establish Rotation Within Field (2-3-4 yr.) – This practice is used similar to practice no. 5, but is used where the field is from 20 to 40 acres in size (approx. 8 - 16 hectares).
7	Establish Field Rotation (2-3-4 yr.) – This practice is used similar to practice no. 5, but is used where the field

is less than 20 acres (approx. 8 hectares). The entire field is planted in the same crop any one year.

8 Plant Row Crops Each Year With Winter Cover Crop – This practice is used on Classes I, IIw, IIIw, and IVw when put to row crops.

9 Establish Strips for Wind Erosion Control – This practice is used on sandy fields 40 acres (approx. 16 hectares) or more where wind erosion is a problem.

10 Plant Perennial Strips – This practice is used to supplement terraces or as a substitute for terraces. It is most frequently used where an abrupt slope occurs in a gently sloping field. Perennial strips are also used in fields to supplement terraces where long, fairly steep slopes occur, and on fields of fairly deep sand or "choppy" areas where terraces are not recommended.

11 Burn No Crop Residue – The practice of burning crop residue on cropland is always discouraged.

12 Establish Drainage System – This may be either open ditch drainage or tile drainage. Drainage is recommended on all "w" classes of land used for cultivation or pasture.

13 Sow Perennial Strips on Ditch and Road Banks – This practice is used along ditches or roads where rows or terraces butt against them. This provides a place to turn equipment, prevents erosion from row and terrace drainage, and discourages farmers from running turn rows up and down the hill. These strips provide some hay or seed and food and cover for wildlife.

14 Plant Wildlife Food Strip on Field Borders – This practice is used along edges of fields that are shaded by woods or along hedge rows to provide food and cover for wildlife. It also provides a turning space for equipment.

15 Apply Limestone – This practice is recommended on crop land and pasture where the pH is below 6.0. The pH of the soil is given in a soil identification contest.

16 Apply Complete Fertilizer – This practice is always used on all cropland and new pastures, and also on established pastures where soil tests show phosphate and potash at medium or lower levels.

17 Apply Nitrogen Topdressing – This practice is used on newly planted young pasture grasses or perennials to stimulate growth, and on established pasture sod or perennials that have little or no legumes present.* This encourages early spring growth and promotes continuous growth throughout the growing season.

*Nitrogen should not be applied to permanent pastures containing more than 35 percent legumes.

18 Apply Phosphate – This practice is used on established pastures where the need for phosphate is indicated by a soil test and complete fertilizer is not needed. It is used on pastures and cropland where soil tests indicate phosphate is very low.

19 Apply Potash – Same as No. 18.

20 **Establish Permanent Pasture** – This is recommended on land not suitable for row crops due to soil conditions, slope, or erosion; also where pasture could be utilized to better advantage than a hay crop or timber products. The area may be ideally suited for pasture due to location or needs of the farm.

21 **Plant to Perennials** – This practice is used on land where the soil is not suited for row crops due to soil condition, erosion, or slope; also where a hay crop would be more practical than pasture and where pasture grasses are not adapted.

22 Plow and Reseed Pasture – This practice is recommended on established pastures where the present grasses are not of desirable species or the stand has been thinned to the extent that reseeding is the best method to re-establish.

23 Mow or Spray Pasture or Perennials for Weed Control – This practice is required on new pastures and perennials

and is also used on established pastures and perennials where weeds are found.

24 Topseed Winter Annuals on Pasture – This is often recommended on permanent summer grasses where additional winter grazing is needed.

25 Harrow and Seed to thicken Sod – This practice is used where a sod of permanent grass has become thin and it is desirable to thicken the sod with more desirable plants.

26 Cut Brush or Briars in Pasture or Perennials – This is recommended where briars and brush are found.

27 Cross Fence for Rotational Grazing – This is usually recommended where the pasture is 20 acres (approx. 8 hectares) or larger.

28 Practice Rotational Grazing – This is recommended where the pasture is less than 20 acres (approx. 8 hectares).

29 Provide Water Facilities for Livestock – This practice is used when there is no water available in the pasture.

30 Plant to Trees – This practice is recommended where the area is not adapted to row crops due to slope, erosion, or soil condition and pasture or hay is not adapted or needed.

31 Plow Firebreaks – This practice is used where the tract of woods is 50 acres (approx. 20 hectares) or larger. It is also recommended where a tract of woodland on one farm joins woods on another farm or farms even though the individual tract is smaller than 50 acres (approx. 20 hectares). Firebreaks are recommended around newly planted and young seedlings regardless of acreage.

32 Thin for Pulpwood – This practice is used when the stand is large enough for thinning to encourage growth, but is not yet large enough for sawtimber.

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33 Mark, Measure and Sell Timber – This is used where some or all of the stand is large enough (at least 10 inches or 25.4 cm) for sawlogs. Thinning may be needed to improve the stand composition or to encourage maximum growth. Part or all of the stand may need to be removed because it is mature, to prevent loss due to death and decay.

34 Do Timber Stand Improvement–Cut or poison low grade trees – This practice is used in stands of timber where low-grade trees are preventing the growth of more desirable trees. These low-grade trees may be of any species.

35 Replant Open Spaces in Woods – This is recommended in woods where open spaces of 1/4 acre (10.12 ares) or larger occur and it is evident that natural reforestation will not occur or will be very slow.

36 Plant Wildlife Food Patches in Openings in Woods – This practice is recommended in small openings in wooded areas to encourage wildlife. The areas should be approximately 1/8 of an acre (5.06 ares) in size and larger. Total acres in wildlife food patches should occupy approximately 2 - 5% of forest land.

37 Protect Woods from Damage by Grazing – This practice is recommended where trees are less than 10 feet (3.05 meters) in height and it is evident that grazing would be damaging.

38 Clearcut and Plant to Trees – Clearcutting is an operation where all the trees are cut on an area which is to be re-generated. Clearcutting is recommended in the following stands: (1) even-aged containing mature or overmature trees; (2) stocked with undesirable species which should be replaced by desirable ones; (3) containing trees of any age which are beyond recovery because of damages caused by fire, insects, sleet, or other causes. Clearcutting is not recommended on steep lands subject to water erosion.

39 **Develop Into Wildlife Area** – This is recommended where the area is small and is in a desirable location for wildlife. The area is usually too small to put back into cultivation.

SECTION FOUR
SOIL AND WATER CONSERVATION PLAN

You now have some knowledge about placing a soil according to its land capability class based on its physical characteristics. And, you have some experience in selecting appropriate treatments or practices needed for land. Now, you are almost ready to prepare a conservation plan for a farm. But, you are still an amateur. And, even after years of farming experience, you will probably find it wise to use services of a soil conservationist to help you construct such a plan. However, the knowledge and skill you have attained will make you more aware of the need for such a plan and better able to interpret and implement such a plan. An example of a soil and water conservation plan and the steps involved in constructing such a plan follows.

The first step in preparing a soil and water conservation plan is to obtain a soil and capability map, see page 56. Note that the

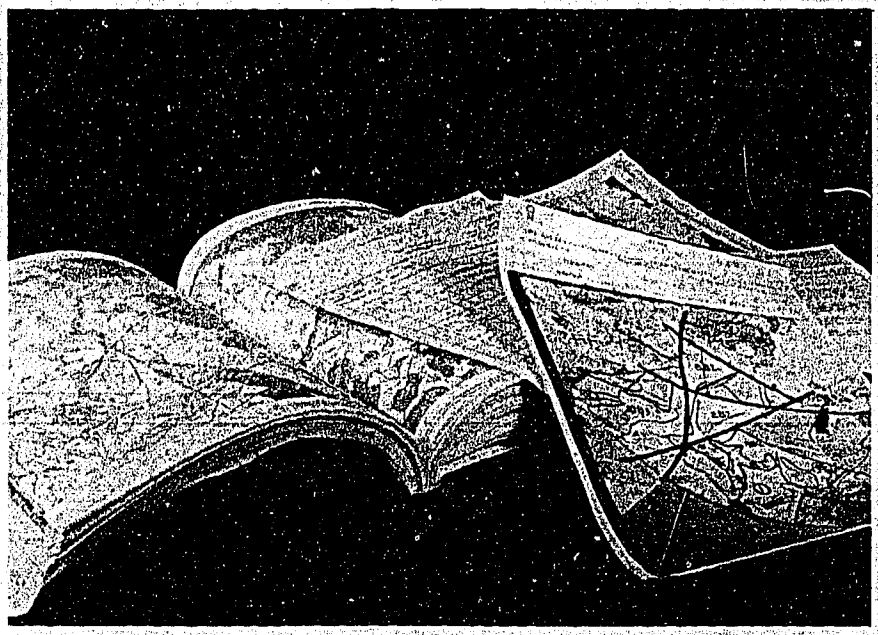

Figure 33. When we know the classes of land on a farm, we are better prepared to select enterprises and match land with the crops to be grown. We are also better prepared to select needed conservation practices.

land capability classes are color coded as follows: Class I – Light Green, Class II – Yellow, Class III – Red, Class IV – Blue, Class V – Dark Green, Class VI – Orange, Class VII – Brown, Class VIII – Purple. A portion of the description which accompanies the map is shown on page 57.

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Figure 34. Sample of a soil and capability map.

SCCONS-4
Revised 12-71

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
COLUMBIA, SOUTH CAROLINA

SOIL SURVEY INTERPRETATIONS
For Conservation Planning

Anderson County

Frank Farr
(Owner)

ES-3FF-54 (1)
(Photo Sheet and Farm No.(s))

Map Symbol - Soil Name	Capability Unit	Woodland Suitability Group	Description
2B1 Appling sandy loam 8B2 Cecil sandy loam	IIe-6 IIe-6		Gently sloping soils on uplands with slight to moderate erosion. These soils have loamy surface layers and yellowish, brownish, or reddish clayey to loamy subsoils through which water moves at a moderate or moderately rapid rate.
8C2 Cecil sandy loam	IIIe-5		Gently sloping soils with slight to severe erosion and sloping soils with slight to moderate erosion. Deep or moderately deep, reddish or brownish soils through which water moves at a moderate rate.
37E2 Pacolet sandy loam	VIe-2		Moderately or severely eroded sloping soils or strongly sloping to steep soils on uplands. These soils have firm or friable clayey or loamy subsoils through which water moves at a moderate rate.
51 Worsham	Vw-4		Nearly level to gently sloping, poorly drained soils. These soils have gray loamy surface layers and gray clayey subsoils.

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Figure 35. Descriptions of the soils shown on the soil and capability map.

Figure 36. A soil and water conservation plan.

SCS-CONS-6
Rev. 9-70
Min Code CH-11

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RECORD OF COOPERATOR'S DECISIONS
AND PROGRESS IN APPLICATION

COOPERATOR Frank Parr
ASSISTED BY George L. Watkins
DATE 10-25-74

FIELD NUMBER	PLANNED		APPLIED		LAND USE AND TREATMENT M-1-5
	AMOUNT	YEAR	AMOUNT	MONTH AND YEAR	
					CROPLAND
7	16 Ac.	1976			Conservation Cropping System: Establish a two-year strip rotation of 8 acres of small grain followed by no-till planted soybeans in alternate strips with 8 acres of cotton.
7	0.5 Ac.	1975	0.5 Ac.	10/75	Grassed Waterways or Outlets: Clear and shape shallow waterway to planned design. Prepare seedbed and plant to fescue and clover. Use soil test as a guide in applying lime and fertilizer. Mulch with two tons per acre of grain straw.
4	0.5 Ac.	1976			
					PASTURELAND
1	24 Ac.	1975	24 Ac.	10/75	Pasture and Hayland Planting: Plant to fescue and ladino clover. Use soil test as a guide for applying lime and fertilizer.

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Figure 37. A record of the improvements to be made.

After considering the soil and capability map and studying current farming operations, a soil and water conservation plan is constructed. The plan may require considerable changes in the farming practices being used. For example, land previously planted to row crops may need to be planted to close growing crops, at least part of the time, or terraces may be required. However, changes are seldom so extensive that the entire type of farm operation has to be changed. An example of a soil and water conservation plan agreed upon by the farmer and the Soil Conservationist is shown on page 58. Some of the conservation treatments recommended for the farm shown in our example are given on page 59.

You can obtain a soil and capability map of your home farm from your local soil conservationist. You can also obtain the services of the local soil conservationist in preparing a soil and water conservation plan.

The advantages of a soil and water conservation plan are as follows:

- The plan is the farmer's guide for treating and using each acre of his land in accordance with good conservation practices.
- The plan sets up a schedule of conservation practices needed on the land. These practices are agreed upon by the farmer and the Soil Conservation Service. They are based on the needs of the land, and the farmer's ability to apply and maintain each practice.
- The plan provides for an orderly establishment of practices which support each other and insures against installation of unrelated practices.
- The plan makes provisions for different uses of the land in keeping with sound conservation principles. The needs of the farmer are taken into consideration.
- The plan is flexible enough to meet economic changes.
- The plan gives specific, clearly stated instructions for the establishment and maintenance of each individual conservation measure.
- The plan is a way through which individual farmers obtain technical assistance from their local Soil Conservation District.
- The plan is a basis for determining needed work for both SCS and the Soil Conservation District.
- The plan is also the basis for reporting planned and applied conservation accomplishments.

The plan is the basis of the entire soil, water, plant and wildlife conservation program as carried out through the local Soil Conservation District.

The development of a soil and water conservation plan is only one of many services provided by the Soil Conservation Service. Another recent and especially useful service includes the publication of county soil survey maps. You may wish to obtain a copy of the survey maps for your county from your local soil conservationist. A published soil survey contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation. All the soils in a county are shown on a detailed soil map at the back of the publication. This map consists of many sheets made from aerial photographs. Figure 39 is a portion of one of these sheets. Soils areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil.

The "Guide to Mapping Units" in front of the soil map in the publication shows the name of the soil, the capability classification, and the woodland suitability group. Other information may be found by turning to the section which contains the desired information. The publication contains sections on Description of the Soils; Capability Grouping; Soil Suitability for Crops; Woodland; Use of Soils for Wildlife; Engineering Uses of Soils; and Town and County Planning. For people interested in how soils are formed and how they are classified, there is a section on Formation and Classification of the Soils.

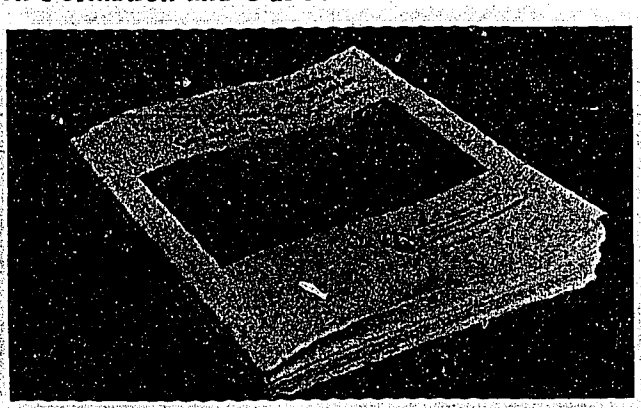

Figure 38. Soils survey of Florence and Sumter counties, South Carolina.

Figure 39. A portion of a typical map shown in a soil survey.

SECTION FIVE
THE FFA SOIL JUDGING CONTEST

The major purposes of this publication, as mentioned in the introduction, were to have you be able to:

1. Classify soils according to current classifications used by the Soil Conservation Service.
2. Select treatments needed for a given soil class according to current recommendations provided by the Soil Conservation Service.
3. Interpret a typical land capability map provided by the Soil Conservation Service.

The FFA Soil Judging Contest provides an interesting means of preparing yourself to reach these goals. By participating in this contest you will be able to further develop your skills while competing for recognition, trips and prizes. Should your team become skilled enough, you may be able to compete at the state or national level.

The FFA Score Card is shown on the following page. Note that Part I requires that you classify a soil by each of the major

Figure 40. FFA soil judging teams at a contest.

SOIL IDENTIFICATION PLACING CARD

Group No. _____ Field No. _____
(Indicate your answer by an (X) in the square.)

Contestant Number _____
(Indicate rotation by circling the year)

PART I—LAND CLASS FACTORS—30 Points

SCORE

Surface Texture
- ☐ Coarse
- ☐ Light
- ☐ Medium
- ☐ Fine

Subsoil Permeability
- ☐ Slow
- ☐ Moderate
- ☐ Rapid
- ☐ Very Rapid

Depth of Surface Soil and Subsoil
- ☐ Deep
- ☐ Moderately Deep
- ☐ Shallow
- ☐ Very Shallow

Drainage
- ☐ Very Poor
- ☐ Poor
- ☐ Fair
- ☐ Good
- ☐ Excessive

Erosion – Wind or Water
- ☐ Alluvial Deposits
- ☐ Colluvial Deposits
- ☐ None to Slight
- ☐ Moderate
- ☐ Severe
- ☐ Very Severe
- ☐ Very Severe Gullied

Slope
- ☐ Nearly Level
- ☐ Gently Sloping
- ☐ Sloping
- ☐ Strongly Sloping
- ☐ Moderately Steep
- ☐ Steep
- ☐ Very Steep

Major Factors Considered
- ☐ Texture
- ☐ Permeability
- ☐ Depth
- ☐ Slope
- ☐ Erosion
- ☐ Drainage

Land Capability Class No.
- ☐ Class I
- ☐ Class II
- ☐ Class III
- ☐ Class IV
- ☐ Class V
- ☐ Class VI
- ☐ Class VII
- ☐ Class VIII

Indicate Subclass Except on Class I

PART II—LAND TREATMENT—30 Points

SCORE

- ☐ 1. Plant to row crops
- ☐ 2. Farm on contour
- ☐ 3. Terrace and farm on contour
- ☐ 4. Establish meadow outlets
- ☐ 5. Establish strip rotation (2-3-4 yr.)
- ☐ 6. Establish rotations within field (2-3-4 yr.)
- ☐ 7. Establish field rotation (2-3-4 yr.)
- ☐ 8. Plant row crops each year with winter cover crop
- ☐ 9. Establish strips for wind erosion control
- ☐ 10. Plant perennial strips
- ☐ 11. Burn no crop residue
- ☐ 12. Establish drainage system
- ☐ 13. Sow perennial strips on ditch and road banks
- ☐ 14. Plan wildlife food strips on field borders
- ☐ 15. Apply limestone
- ☐ 16. Apply complete fertilizer
- ☐ 17. Apply nitrogen topdressing
- ☐ 18. Apply phosphate
- ☐ 19. Apply potash
- ☐ 20. Establish permanent pasture
- ☐ 21. Plant to perennials
- ☐ 22. Plow and reseed pasture
- ☐ 23. Mow or spray pasture or perennials for weed control
- ☐ 24. Topseed winter annuals on pasture
- ☐ 25. Harrow and seed to thicken sod
- ☐ 26. Cut brush or briars in pasture
- ☐ 27. Cross fence for rotational grazing
- ☐ 28. Practice rotational grazing
- ☐ 29. Provide water facilities for livestock
- ☐ 30. Plant to trees
- ☐ 31. Plow firebreaks
- ☐ 32. Mark, Measure and Thin for Pulpwood
- ☐ 33. Mark, measure, and sell timber
- ☐ 34. Do Timber Stand Improvement—Cut or poison low grade trees
- ☐ 35. Replant open spaces in woods
- ☐ 36. Plant wildlife patches in openings in woods
- ☐ 37. Protect woods from damage by grazing
- ☐ 38. Clearcut and Plant to Trees
- ☐ 39. Develop into wildlife area

SCORE PART I (Possible 30) _____	SCORE PART II (Possible 30) _____	TOTAL SCORE (Possible 60) _____

soil characteristics – surface texture, subsoil permeability, depth of surface soil and subsoil, erosion, drainage and slope. You must also select the land class and subclass. The total points possible on Part I is 30. Part II requires that you select the recommended land treatments for an additional 30 possible points.

A master score card and field condition sheet is shown on the pages following the score card. This sheet provides information needed for determining the land class and for selecting recommended conservation practices.

MASTER SCORE CARDS AND FIELD CONDITION SHEETS

The following is an example of a master score card for Part I, Land Class Factors:

Factor	Correct Placing	Allowed Score
Texture	Light	3
Subsoil Permeability	Moderate	3
Depth of Surface Soil and Subsoil	Deep	3
Slope	Gently Sloping	4
Erosion	Severe	6
Drainage	Good	3
Major Factors	Slope and Erosion	2
Land Capability Class	IIIe	8
	TOTAL	30 points

After the land capability class is determined, the soil judging participant again checks the condition sheet "Condition of Field for Soil Judging." The condition sheet below provides information for selecting the 10 recommended practices.

CONDITIONS OF FIELD FOR FFA SOIL JUDGING

FIELD NO. 1

1. Assumed soil test. pH 5.3 Phosphate VL Potash MED .
2. Pay no attention to conservation practices on field.
3. Thickness of original topsoil was 10 Inches (25.4 cm) .

4. Field to consider is 25 (approx. 10 hectares) acres Cultivated.

5. Consider the (most intensive) (best)* use of the land.

6. Other conditions are General farm-field borders a highway on one side and woods on another.

7. Use 10 practices in Part II.

*The term, "most intensive use," on the condition sheet means row crop rotations in Classes I, II, III, and IV or permanent pasture or perennials in Classes V, VI, and VII. The term, "best use," means permanent pasture, perennials or trees. Use will be dependent upon other conditions as stated in item 6 above.

The 10 correct practices and their appropriate scores would be:

Practice Number	Practice	Allowed Score
1	**Plant to row crops**	2
3	Terrace and farm on contour	5
4	Establish meadow outlets	5
6	Establish strip rotation (2 - (3) - 4 yr.)	5
11	Burn no crop residue	2
13	Sow perennial strips on ditch banks and road banks	3
14	Plant wildlife food strips on field borders	2
15	Apply limestone	2
16	Apply complete fertilizer	2
18	Apply phosphate	2
	TOTAL	30 pts.

Using the same land capability class, IIIe, but a different condition sheet as seen below, the participant would select eight practices appropriate to the land capability class and the conditions proposed for field No. 2 below.

CONDITIONS OF FIELD FOR FFA SOIL JUDGING
FIELD NO. 2

1. Assumed soil test. pH 5.3 Phosphate VL Potash MED.

2. Pay no attention to conservation practices on field.

3. Thickness of original topsoil was 10 Inches (25.4 cm) .

4. Field to consider is 25 (approx. 10 hectares) acres cultivated .

5. Consider the (most intensive) (best) use of the land.

6. Other conditions are Beef cattle farm — No streams or springs within field.

7. Use 8 practices in Part II.

The eight correct practices and their appropriate scores would be:

Practice Number	Practice	Allowed Score
15	Apply limestone	3
16	Apply complete fertilizer	3
17	Apply nitrogen topdressing	3
18	Apply phosphate	3
20	Establish permanent pasture	6
23	Mow or spray pasture or perennials for weed control	4
27	Cross fence for rotational grazing	5
29	Provide water facilities for livestock	3
	TOTAL	30 points

APPENDIX A

TERMS USED IN CLASSIFYING SOIL AND IN DETERMINING RECOMMENDED LAND USE TREATMENTS

Aeration – Refers to the amount of air in the soil.

Alluvial deposits – This is soil deposited by streams.

Annual crops – Crops that are seeded each year.

Border strip – Refers to planting the edges (strips of fields next to woods) in some close growing crop.

Choppy – Refers to an area of land which has a very irregular surface; usually numerous dome-like mounds of sand and clay.

Capillary action – The movement of water in the soil.

Colluvial deposits – This is soil deposited from nearby slopes.

Conservation – Means the wise use of soil, water, wildlife and forest.

Conservation practices – The best methods of managing soil and water.

Contour farming – Running rows on the level or with a slight amount of fall.

Crop residue – Plants or parts from the preceding crop left on the land.

Crop rotation – Planting crops in regular succession year after year on the same land.

Consistency – The way in which soil particles hold together.

Depth of soil – The distance from the surface to the parent material.

Drainage – Refers to the presence or absence of excess water in the soil for varying lengths of time.

Draws – Refers to low places, or small valleys in a field.

Droughty – Refers to well drained soils which have very sandy topsoil and subsoil.

Field moisture capacity – Refers to the amount of water held in a soil after all excess water has drained away.

Flooding, Duration

Very Brief – Less than 2 days
Brief – 2 to 7 days
Long – 7 days to 1 month
Very Long – More than 1 month

Flooding, occasional – Less often than once in 2 years.

Flooding, frequent – More often than once in 2 years.

Galled – Areas from which much or all of the topsoil has been removed.

Gully erosion – A small gorge or valley caused by running water.

Hardpan – A hard, compact layer of the soil usually about plow-depth.

Hazards – Soil hazards refer to dangers or problems of a certain land area.

Horizons – Layers of soil are called soil horizons. A horizon – surface; B horizon – subsoil; and C horizon – parent material.

Humus – Dark colored material in the soil formed by the decay of animal and plant life.

Infiltration – The downward entry of water into the surface soil.

Land capability classes – All land is grouped into classes based on what it is best suited for and its needs.

Leaching – The loss of plant nutrients through the downward movement of water.

Legumes – Crops which have nodules on their roots and are able to gather nitrogen from the air.

Mottled subsoil – A mixture of several colors of soil in one area.

Overflow – Refers to areas of land which are covered with water due to rainfall.

Parent material – Mineral particles from which the soil is formed.

Perennial crops – Crops which come back from the roots each year such as alfalfa and sericea.

Permeability – Refers to the movement of water and air in the soil.

Plant nutrients – Elements which plants feed on, such as nitrogen, phosphorous, and potassium.

Rill erosion – Very small gullies caused by running water.

Rotated crops – Planting a different crop in a designated field each year or a number of years, such as a 3 year rotation. Rotated crops may consist of row crops each year (e.g., tobacco - soybeans - corn) or may be a combination of row crops and close growing crops (e.g., corn - wheat - soybeans).

Separate – Refers to the size of individual soil grains such as sand, silt and clay.

Sheet erosion – Refers to losing the soil in thin, sheetlike layers.

Slope – Is the number of feet of fall in each 100 feet measured horizontally in the direction of the steepest slope.

Soil profile – A section of the soil which includes the topsoil, subsoil, and parent materials.

Soil series – Is a soil name given to a group of soils which have the same general characteristics throughout their profiles. Examples of different soil series are Cecil, Iredell, Norfolk, Coxville, etc.

Soil type – Is a combination of the soil name (series) and textural name of the surface soil such as Cecil sandy loam or Norfolk loamy sand.

Soil sample – A small portion of soil (pint or quart) used for testing to determine the need for lime and plant nutrients.

Structure – Refers to the way the soil grains are arranged to build aggregates, crumbs, and nut-like or blocky units in the soil.

Tillage – Preparing the soil for planting by plowing, disking and harrowing.

Tilth – Refers to the condition or workability of the soil.

Terrace outlet – Where the terrace empties surplus water.

**Texture* – Refers to the way a soil sample feels as determined by the proportions of sand, silt, and clay particles in the soil.

Vegetative cover – Refers to keeping the land in a crop of legumes, grasses or trees.

Wildlife area – Land which is set aside or planted to food crops for wild animals and birds.

*For a more complete definition of texture and texture classes see Appendix B.

APPENDIX B

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

	PERCENTAGES			
TEXTURE CLASS	SAND	SILT	CLAY	EXAMPLES
Sand	+85	−15	−10	90-6-4
Loamy sand	70-90	−30	−15	85-10-5 or 80-12-8
Sandy loam	43-85	−50	−20	75-15-10 or 50-45-5
Sandy clay loam	45-80	−28	20-35	65-10-25
Clay loam	20-45	15-53	27-40	32-33-35
Sandy clay	45-65	−20	35-55	45-10-45
Loam	23-52	28-50	7-27	45-40-15
Silt loam,	20-50	50-80	12-27	25-55-20
or	−	50-80	−12	15-75-10
Silt	−	+80	−12	5-90-5
Silty clay loam	−20	40-73	27-40	10-55-35
Silty clay	−20	40-60	40-60	10-40-50
Clay	−45	−40	+40	10-30-60

+ = more than
− = less than

As defined by United States Department of Agriculture

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